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WALTON AND HOLMES'S

ARITHMETICS

FIRST BOOK

BY

GEORGE A. WALTON, A.M.

AUTHOR OF FRANKLIN ARITHMETICS
FORMERLY AGENT OF MASSACHUSETTS STATE BOARD OF EDUCATION

AND

STANLEY H. HOLMES, A.M.

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W. P. I

PREFACE

THIS book is the first of a series designed to give a complete course of study in arithmetic for elementary grades beyond the second year in school. Part I is intended for a review of such ground as the pupil should have covered before beginning the use of a text-book. It takes up counting to one hundred and the combinations of numbers to twenty as a number limit. In this part of the book, oral and mental exercises predominate.

Part II introduces more advanced written and oral work, and makes steady progress in measurements, denominate numbers, and simple fractions.

It is designed to serve the teacher as a guide and the pupil as a text-book for the advance work in numbers to be taken in the third school year.

Recent changes in thought and practice as to numbers and number teaching have been met in what is believed to be a rational manner. Diagrams, illustrations, measurements, etc., have been liberally employed. The idea that notions of number and numerical operations should be acquired from the concrete has been given full recognition. Measuring and comparison of magnitudes and values are constantly employed and are made the basis for abstract number concepts.

The need for accuracy and facility in the fundamental processes with abstract numbers is met by a systematic presentation of the elementary combinations and an increased amount of practice upon the more difficult of these combinations. The amount of practice given upon any particular combination should be proportional to the difficulty which children in general have in mastering it. It is well known to practical teachers that combinations like 8 and 5 which have results in

a higher decade are more difficult than combinations like 3 and 5 which have results in their own decade. This principle of special attention and drill upon the more difficult combinations is applied in each of the fundamental processes. Time should be saved to the pupil by the skill thus acquired, as well as by the uniform avoidance of long and involved ciphering processes.

It has been the endeavor of the authors to arrange the work in accordance with the order of the child's mental development, to keep the work presented within the child's ability to do, so that he may gain a sense of power, mastery, confidence, and satisfaction in his number work. The logic of the subject itself has been subordinated in arrangement of matter to the interests of the child. This is essentially an arithmetic reader, in that oral work predominates in large measure. This fact should be kept in mind, and the oral side of arithmetic work should be made much more prominent than it generally is in primary grade work.

The teacher is helped by numerous illustrations, illustrative examples, suggestive notes, etc., which occur in the book at the times and places when and where they should be read and used. This arrangement seems to promise more for the successful teaching of the subject than the placing of such suggestive material in a special teacher's manual.

Another feature of the book is the great number and variety of exercises. This meets a demand which teachers have long felt.

The authors acknowledge with gratitude their obligation to the large number of teachers who have made helpful suggestions and contributed valuable material. They are especially indebted to Miss A. J. Meadowcroft, Principal of the Burnham School, Haverhill, Massachusetts, for assistance in preparing the manuscript of this book.

G. A. W.
S. H. H.

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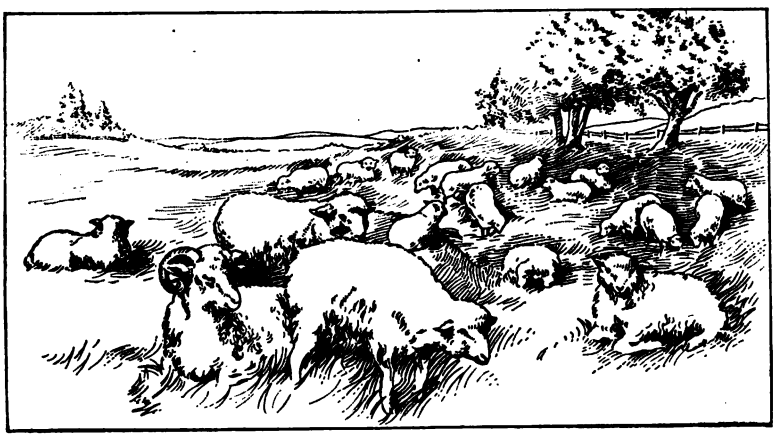
FIRST BOOK

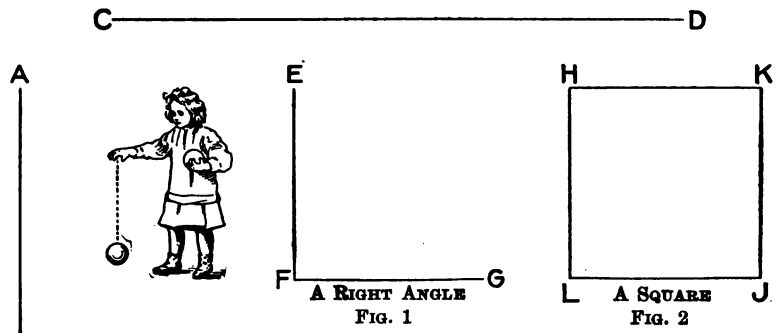
PART I



COUNTING EXERCISE

1. Here is a picture of —— sheep.
2. In the schoolroom there are —— children.
3. Count all the panes of glass in the schoolroom.
4. Write the figures for the numbers from one to twenty.

NOTE. The teacher should supply objects to be counted and be sure that, in counting, the pupil has the magnitude idea of numbers and not simply the ordinal idea.



A Right Angle
Fig. 1

A Square
Fig. 2

Oral Exercise

1. If you let a ball drop, it falls in a line that is straight up and down. The line is a **vertical line.**

Hold your pencil in a vertical line. Stand your book upright on the desk and count the vertical lines on this page.

2. Hold your pencil so that it does not point or tip either up or down. It is in a **horizontal line.**

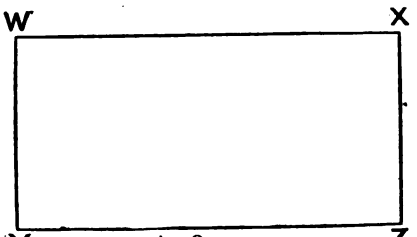
Show me a horizontal line on the blackboard. Name the horizontal lines on this page. How many are there?

3. Figure 1 is a **right angle.** How many right angles are shown on the page?

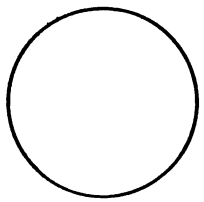
4. Figure 2 is a **square.** How many right angles are there in the square? how many sides? Measure each side, and see whether they are all of the same length.

5. If each side of the square is one inch in length, how many inches is it around the square?

Note. The teacher should draw the lines and figures on the board for use in recitations. There should also be provided for class use, squares, oblongs, and circles. These can be cut from cardboard.



AN OBLONG
FIG. 3



A CIRCLE
FIG. 4

6. Figure 3 is an **oblong**. How many right angles has it? Which sides are of the same length?

7. Tell how a square and an oblong differ. Draw on the blackboard a square and an oblong.

8. The oblong in the picture is two inches long and one inch wide. How many inches is it around the oblong?

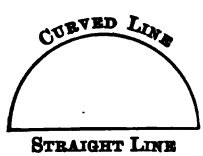
9. Figure 4 is a **circle**. Point out something in the schoolroom that is shaped like a circle.

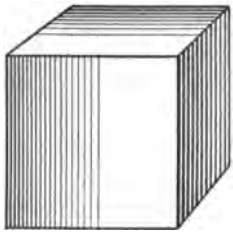
10. Point out something in the schoolroom that is a square. Point out an oblong. Point out a right angle.

11. Point to some horizontal lines in the window sash.

12. Point to some vertical lines in the window sash.

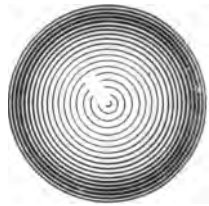
DICTATION BY THE TEACHER. Pupils having paper, pencil, a straight-edged ruler and a circular disk, the teacher dictates: Lay the disk upon your paper. Make on the paper two dots on opposite sides of the disk and connect them with a line drawn along the edge of the disk. You have made a **curved line**. Remove the disk and draw a line connecting the two points. You have made a **straight line**.





A CUBE
FIG. 1

A CYLINDER
FIG. 2



A SPHERE
FIG. 3

Oral Exercise*

1. Figure 1 is a picture of a **cube.** See if you can find some object in the schoolroom that is a cube.

2. Each one of the faces of a cube is shaped like what figure on page 8?

3. Count the faces of a cube. How many are there? Each face has how many right angles?

4. Figure 2 is a picture of a **cylinder.** Find some object in the schoolroom that is a cylinder.

5. How many flat faces has a cylinder? How many curved or round faces has it?

6. Figure 3 is a picture of a **sphere.**

7. An orange has the shape of a ——.

8. A round pencil that has never been sharpened has the shape of a ——. A ball has the shape of a ——.

9. Name four objects that are **spherical** (shaped like a sphere). Name four that are **cubical.** Name four that are **cylindrical.**

* NOTE. The teacher should present the objects to the pupils.

Oral Exercise

MATERIAL: two strips of paper each 6 in. long and 1 in. wide, for each child.

DICTATION BY THE TEACHER. 1. Take up one of the strips. Place the two ends together and crease the fold. Open and tear apart.

The strip that has not been torn we call a **whole** strip.

2. Measure with each other the two pieces of the strip you have torn. How do they compare in size?

When we have two or more things of the same size we say they are **equal.**

3. Into how many equal parts did you tear one of the strips of paper?

> **When a thing is divided into two equal parts we call each part *one half.***

4. How many halves are there in a **whole** one?

One half is written in figures thus, $\frac{1}{2}$.

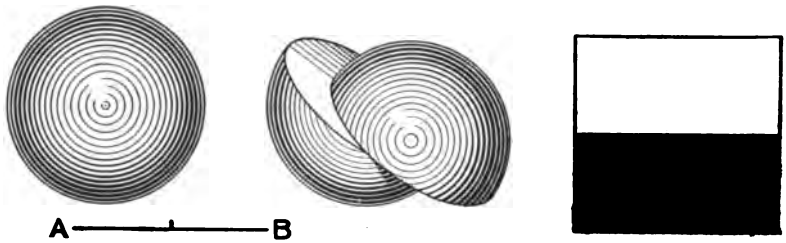
5. Count the squares in Figure *A*.

6. Stand the book upright and tell how many of the lines are vertical; how many are horizontal.

A

2	3	6
3	7	1
4	2	5

7. Put together into one number the numbers written in the right-hand column; in the left-hand column; in the middle column; in the upper row; in the lower row; in the middle row.



Oral Exercise (See Note, p. 10)

1. Into how many equal parts has the square been divided? What is the color of the lower half? of the upper half?

2. Into how many equal parts has one of the balls been divided? What do we call each part?

3. Into how many halves has the line AB been marked? Compare the parts as to their size.

4. If the line AB is 1 inch long, how long is half of it?

5. How many halves can we make of a whole ball? of a whole square? of an apple? of anything?

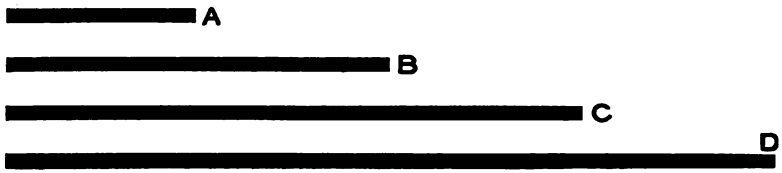
6. How much is one half of an apple and one half of an apple? one-half of a pound and one half of a pound?

7. If you cut an apple into two equal parts and then eat one of the parts, what part of the apple is left?

8. Florence has an orange. She gives half of it to her sister, and eats half herself. How much is left?

9. If you drink half a pint of milk each day, how much do you drink in two days?

10. How much is 1 apple and one half of an apple? How many are 2 apples and one half of an apple?



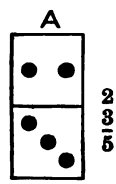
Oral Exercise

1. Line *B* is twice as long as line ——.
2. Line *D* is twice as long as line ——.
3. Line *C* is as long as lines *A* and —— together.
4. Line *D* is as long as lines *A* and —— together.
5. Line *A* is half as long as line ——.
6. Line *B* is half as long as line ——.
7. Line *C* is three times as long as line ——.
8. Line *D* is four times as long as line ——.
9. Line *A* equals one —— of line *B*.
10. Line *B* equals one —— of line *D*.
11. Line *D* is as long as lines —— and ——.
12. Line —— is equal to three times *A*.
13. Line *A* is one inch long. Line *B* is —— inches long. Line *C* is —— inches long. Line *D* is —— inches long.
14. Lines *A* and *B* together are —— inches long.
15. Line *B* is 2 inches long. Line *D* is 4 inches long. Then line *D* is twice as long as ——.
16. Line *A* is —— inch long. Line *C* is —— times as long as line *A*. Then line *C* is —— inches long.

Oral Exercise

1. 1 inch and 2 inches are —— inches.
2. 1 inch and 3 inches are —— inches.
3. 2 inches and 1 inch are —— inches.
4. 3 inches and 1 inch are —— inches.
5. 3 inches equal 2 inches and —— inch.
6. 4 inches equal 2 inches and —— inches.
7. 4 inches equal 3 inches and —— inch.
8. 4 lines 1 inch long are as long as 1 line —— inches long.
9. 1 line 6 inches long is equal in length to 6 lines —— inch long.
10. 2 lines —— inches long are as long as 1 line —— inches long.
11. 1 line 8 inches long is equal in length to 2 lines —— inches long.
12. A 2-inch line and a 5-inch line together equal in length a —— inch line.
13. 1 inch is one half of —— inches.
14. 2 inches are one half of —— inches.
15. One half of 2 inches is —— inch.
16. One half of 4 inches is —— inches.
17. 4 times 1 inch equal —— inches.
18. 2 times 1 inch equal —— inches.
19. 2 times 2 inches equal —— inches.

1. How many dots are there on the lower part of card *A*? on the upper part? on both parts together?



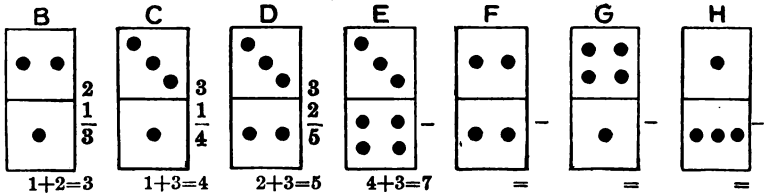
$3 + 2 = 5$

5 is the **sum** of 3 and 2. Putting numbers together to find their sum is called **adding**.

3 and 2 are 5 may be written in column, or in line thus, $3+2=5$. The sign + means *and* or *with*, and is called *plus*. The sign = means *equal* or *equals*.

Written and Sight Exercise

1. Write and add the numbers upon each card below:



Copy examples and write the sums, using both forms:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
2.	6	5	4	2	6	2	7	1	6	3
	1	2	6	3	3	8	1	9	2	2
3.	3	3	8	7	4	1	5	1	1	7
	3	7	1	2	4	7	4	6	8	3
4.	4	4	5	4	5	5	2	2	4	3
	1	3	1	2	3	5	5	7	5	4

NOTE. The teacher should require the above to be given at sight, having the pupils name results only.

Oral Problems and Exercise

1. Dora had 4 needles in her cushion and stuck in 2 more. There were then —— needles in the cushion.

2. I had 3 apples in my basket, and Charles put in 2 more. I then had —— apples.

3. Amy cut 6 white roses and 5 red roses. She cut in all —— roses.

4. Harry picked 4 quarts of cherries on Monday and 5 quarts on Tuesday. He picked in all —— quarts.

5. Charles has 6 marbles, and Ira has 2 more than Charles. Ira has —— marbles.

6. The baby strung 8 buttons on one string and 3 on another. He strung —— buttons in all.

7. Count to 20 by 1's; by 2's; by 5's; by 10's.

8. Read the numbers, 13, 14, 15, 12, 16, 17, 19.

9. Tell what each figure means in 17, 20, 13, 14, 15, 12, 16; thus, 17 means 1 ten and 7 ones; 20 means 2 tens and no ones.

Written and Sight Exercise

Copy, and write the sums as you did on page 15:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	1	2	4	5	4	2	3	2	5	4
	4	2	2	1	3	4	3	6	3	5
2.	3	4	1	2	3	2	1	4	5	3
	2	3	5	3	9	3	3	4	6	2
	2	1	2	4	1	5	6	2	4	5

Written and Sight Exercises

1. To each of the following numbers from 1 to 19, add 1: Thus, $1+1=2$, $1+11=12$, etc.

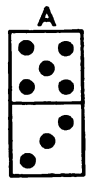
1, 11, 2, 12, 3, 13, 4, 14, 5, 15, 6, 16, 7, 17, 8, 18, 9, 19.

To each of the above numbers

2. from 1 to 18, add 2
3. from 1 to 17, add 3
4. from 1 to 16, add 4
5. from 1 to 15, add 5
6. from 1 to 14, add 6
7. from 1 to 13, add 7
8. from 1 to 12, add 8
9. from 1 to 11, add 9

SUBTRACTION

1. If the number of dots on the lower part of card *A* is taken from the whole number on the card, how many will be left?



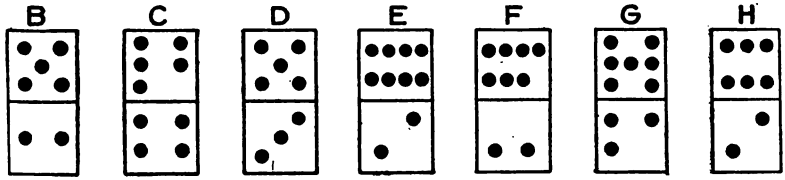
Taking part of a number away to find how many are left is **subtracting.**

The part left is called the **remainder.**

$$\begin{array}{r} 8 \\ 3 \\ \hline 5 \end{array} \qquad 8-3=5$$

3 from 8 equals 5 may be written in column, or in line thus, $8-3=5$. The sign $-$ is read *less* or *minus*.

2. Write in both forms and subtract the lower number on each card from the whole number on the card:



Written and Sight Exercise

Copy examples and write the remainders:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	10	9	8	7	10	6	5	4	10	9
	2	7	4	3	3	2	1	2	4	1
2.	9	8	7	6	10	5	4	9	2	10
	8	5	4	3	5	2	3	5	1	1
3.	8	10	7	6	5	9	8	7	8	10
	6	6	5	4	3	3	7	2	3	7

Oral Problems

1. Carl had 7 doves and sold 2 of them. He had —— doves left.

2. Ernest bought 9 oranges and gave 3 to Anna. He had —— oranges left.

3. Henry had 10 cents. He paid 3 cents for a top. He had —— cents left.

4. Frank threw a ball to me 8 times. I caught it 5 times. How many times did I miss catching it?

5. John's father told him to set out 6 rows of strawberry plants. After he has set out 3 rows how many rows are left to be set out?

6. Agnes found 12 pears and her sister found 10. How many more did Agnes find than her sister?

7. Carrie has 8 dolls and Lucy has 5. How many less has Lucy than Carrie?

Written and Sight Exercise

Subtract at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	2	12	12	3	13	13	4	14.	14	5
	1	1	11	1	1	11	1	1	11	1
2.	15	15	6	16	16	7	17	17	8	18
	1	11	1	1	11	1	1	11	1	1
3.	18	9	19	19	10	20	2	12	3	13
	11	1	1	11	1	1	2	2	2	2
4.	13	4	14	14	5	15	15	6	16	16
	12	2	2	12	2	2	12	2	2	12
5.	7	17	17	8	18	18	9	19	19	10
	2	2	12	2	2	12	2	2	12	2
6.	20	3	13	4	14	14	5	15	15	6
	2	3	3	3	3	13	3	3	13	3
7.	16	16	7	17	17	8	18	18	9	19
	3	13	3	3	13	3	3	13	3	3
8.	19	10	20	4	14	5	15	15	6	16
	13	3	3	4	4	4	4	14	4	4
9.	16	7	17	17	8	18	18	9	19	19
	14	4	4	14	4	4	14	4	4	14

NOTE. Cards containing the elementary combinations in large-sized figures are recommended for class drill, both in addition and subtraction.

Oral Problems

1. Archie is 11 years old. Archie's sister is 2 years older than he. How old is his sister?

2. It is now 5 o'clock. What time will it be in 3 hours?

3. How many days make a week? How many days is it from Sunday to the next week Tuesday?

4. Kate found 4 eggs in one nest, 6 in another, and 5 in another. How many did she find in all?

5. Kate uses 3 eggs. She then has —— eggs left.

6. George is 13 years old and Joseph is 3 years old. How many years older is George than Joseph? In 2 years more how old will each be?

Written and Sight Exercise

Subtract at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	10	20	5	15	6	16	16	7	17	17
	4	4	5	5	5	5	15	5	5	15
2.	8	18	18	9	19	19	10	20	6	16
	5	5	15	5	5	15	5	5	6	6
3.	7	17	17	8	18	18	9	19	19	10
	6	6	16	6	6	16	6	6	16	6
4.	20	7	17	8	18	9	19	19	10	20
	6	7	7	7	7	7	7	17	7	7
5.	8	18	9	19	19	10	20	9	19	20
	8	8	8	8	18	8	8	9	9	9

Oral Problems

1. From a nest of 6 eggs, 5 are taken. —— is left. From a nest of 16 eggs, 5 are taken. —— are left.

2. Mollie is 6 years old. 4 years ago she was ——. Fred is 16 years old. 4 years ago he was ——.

3. May's class has 7 girls. 6 are present, —— is absent. Minnie's class has 17 girls. 16 are present, —— is absent.

4. Two dimes are —— cents. A nickel is —— cents. Two dimes less a nickel are —— cents.

Oral and Written Exercise

Copy and write the sums:

1.	1	2	3	4	5	6	7	8	9	10
	10	9	8	7	6	5	4	3	2	1

2. Name in order each pair of numbers that makes 11.

Copy, and supply the missing numbers:

3.	9	2	3	6	8	7	5	?	4	?
	+2	?	?	?	?	?	?	1	?	10
	11	11	11	11	11	11	11	11	11	11

Add upward and prove your results by adding downward:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
4.	2	3	3	3	4	5	3	4	6	5
	2	1	2	1	2	4	3	5	3	4
	9	1	3	8	5	4	7	3	6	4
	2	10	8	3	4	3	4	3	5	7

Oral Problems

1. George has 6 marbles, Helen has 5 marbles, and I have 2 marbles. How many have we in all?

2. 11 dollars less 9 dollars are how many dollars?

3. Mary spent 4 cents for a spool of cotton, 3 cents for a roll of tape, and 4 cents for a paper of pins. How much did they all cost?

4. In an orchard there are 7 apple trees, 4 pear trees, and 3 peach trees. How many trees are there in all?

5. A man worked in my garden 4 hours on Monday, 4 hours on Tuesday, 3 hours on Wednesday, and 6 hours on Thursday. He worked in all how many hours?

6. There are 9 windows on the front of a house, 3 on one end and 6 on the back. How many windows are there in all?

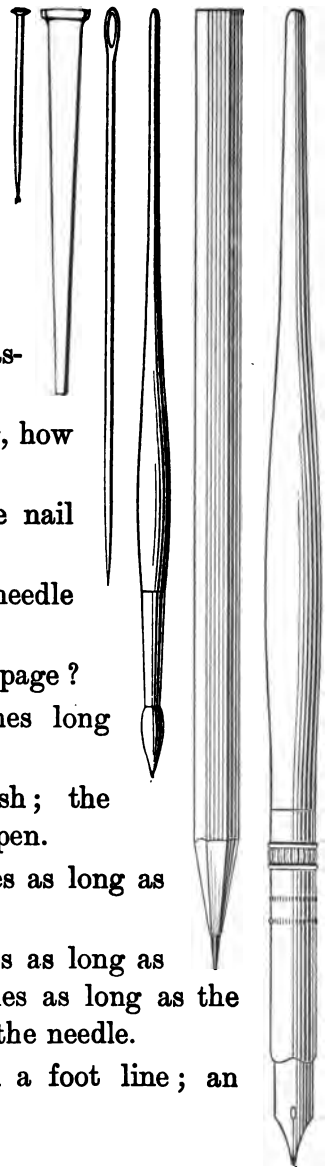
7. A milkman had 11 quarts of milk in a can. He sold 3 quarts at one house and 5 quarts at another. How many quarts had he left?

8. Helen bought some rolls for 5 cents, some cookies for 6 cents, and a yeast cake for 1 cent. How much did they all cost?

9. She gave the clerk 20 cents for what she bought. How many cents did he give her back?

10. There were 11 eggs in a basket. Mother used 6 in making some cake. How many were left?

11. There are 10 plates in one pile and 20 in another. Take 3 from each pile and tell how many of each are left.



Oral Exercise

1. Look at your foot ruler, and tell how many inches it measures.

12 inches equal 1 foot.

2. With your foot ruler measure the length of the pin.

3. If the pin is 1 inch long, how long is the nail?

4. How much longer is the nail than the pin?

5. Measure the darning needle with your foot ruler.

6. How long is this printed page?

7. How many lines 2 inches long equal one 4 inches long?

8. Measure the paint brush; the pencil; the penholder with the pen.

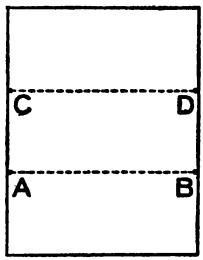
9. A foot ruler is —— times as long as the penholder with the pen.

10. A foot ruler is —— times as long as the paint brush, it is —— times as long as the nail, and —— times as long as the needle.

11. Draw on the blackboard a foot line; an inch line.

Making a Letter Case — Seat Work

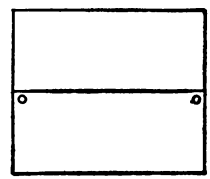
MATERIALS FOR EACH PUPIL: 1 sheet of Manila drawing paper, or light-weight oak tag, 9×7 inches, a foot ruler, a pencil, and 2 paper fasteners.



DICTATION. Place the paper on the desk with the short edge toward you. Measure its length; its width. Measure on the right-hand long edge 3 inches up from the lower edge, and make a dot on the right-hand edge. Measure up on the left-hand edge, 3 inches from the lower edge. Mark with a dot. Draw a straight line connecting these points, and mark it *AB*.

Again measure up on each side 6 inches, and mark with dots on the edges. Connect these dots by a straight line, *CD*.

Fold the sheet over from the bottom up so that the lower edge when folded lies along the line *CD*, and the fold is on the line *AB*. Make holes at the proper places near the edge of the folded portion, and fasten together with paper fasteners. When it is completed, the letter case will look like the figure at the right.



After it is finished, measure the length and width of the case.

NOTE. Suitable decoration in pencil or water color may be applied as an exercise in drawing, and the letter case may be taken home by the child.

Oral and Written Exercise

Copy the following and write their sums:

1.

2	3	4	5	6	7	8	9	10
10	9	8	7	6	5	4	3	2

2. Name in order each pair of numbers that makes 12.

Copy, and supply the missing numbers:

3.

10	9	3	8	4	7	6	5	1	2	11
+2	?	?	?	?	?	?	?	?	?	?
?	12	12	12	12	12	12	12	12	12	12

Copy and add the following, writing the sums:

4.

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1	1	2	2	2	3	2	2	2	3
1	2	2	1	2	1	3	2	2	1
2	1	1	2	3	1	2	3	4	4
6	5	6	8	7	3	3	4	7	8
6	7	5	4	4	9	8	8	5	3

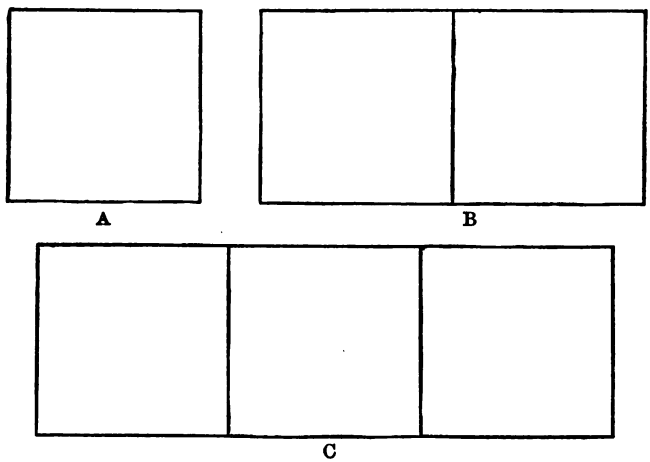
Oral Exercise

1. If a sheet of paper is 12 inches long and 9 inches wide, it is how much longer than it is wide?

2. $9 + \text{——} = 12$. $12 - 9 = \text{——}$.

3. If you take 4 from 12, how many are left?

4. $8 + 4 = \text{——}$. $12 - 4 = \text{——}$. $12 - 8 = \text{——}$.



Oral Exercise

1. Measure the length of *A*. Measure the width of *A*.

A square 1 inch long and 1 inch wide is a *square inch.*

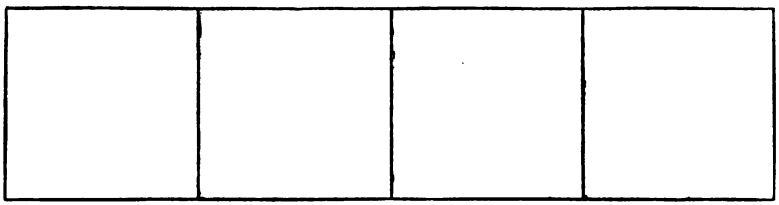
2. Measure the length and width of *B*.

3. Measure the length and width of *C*.

4. Measure the length and width of *D*.

5. If *A* is one square inch, how many square inches is *B*? is *C*? is *D*?

6. *A* is equal to —— of *B*.



D

Oral Exercise

7. B is equal to —— times A.

8. C is equal to —— times A.

9. D is equal to —— times A.

10. B is equal to —— of D.

11. D is equal to —— times B.

12. A and B = —— square inches.

13. A and C = —— square inches.

14. D contains —— more square inches than A; than C; than B.

15. C contains —— more square inches than A; than B. C contains —— less square inches than D.

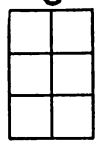
16. It is —— inches around the 1-inch square, A. It is —— inches around the 2-inch oblong B.

17. It is —— inches around the 3-inch oblong, C. It is —— inches around the 4-inch oblong, D.

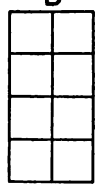
A

B

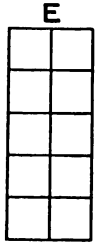
C



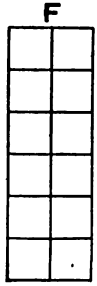
D



E



F



Oral Exercise

1. How many squares are there in *A*?

2. How many squares are there in *B*?
How many times 2 squares are there in *B*?
2 times 2 squares are how many squares?

3. How many squares are there in *C*?
How many times 2 squares are there in *C*?
3 times 2 squares are how many squares?

4. How many squares are there in *D*?
How many times 2 squares are there in *D*?
4 times 2 squares are how many squares?

5. How many squares are there in *E*?
How many times 2 squares are there in *E*?
5 times 2 squares are how many squares?

6. How many squares are there in *F*?
How many times 2 squares are there in *F*?
6 times 2 squares are how many squares?

Show by use of blocks that:

7. $2+2=4$, or 2 times $2=$ ——
8. $2+2+2=6$, or 3 times $2=$ ——
9. $2+2+2+2=8$, or 4 times $2=$ ——
10. $2+2+2+2+2=10$, or 5 times $2=$ ——
11. $2+2+2+2+2+2=12$, or 6 times $2=$ ——

Oral Problems

1. How many feet do 6 chickens have?

2. If 2 marbles can be bought for 1 cent, how many can be bought for 4 cents?

3. If 2 pens cost 1 cent, how many will 5 cents buy?

4. A quart of milk costs 3 times 2 cents. How much does it cost? How much does a half quart cost?

5. Two 5-cent pieces are equal to how many cents?

6. A boy sold 3 papers for 2 cents each. How much did he receive in all?

7. There are six pieces of candy for 2 little girls. How many pieces will each get?

8. If 4 boys get 8 figs, how many will each boy get?

9. There are 12 cents in 6 piles. How many are there in each pile?

10. A ball of twine costs 2 cents. How many balls can you buy for 12 cents?

MULTIPLICATION

We have found that $2+2+2=6$, so we say that 3 times 2 are 6, or that three 2's united make the number 6.

6 is called the **product** of 2 by 3.

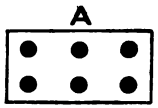
Uniting equal numbers to find their product is called **multiplying.**

3 times 2 are 6 may be written thus, $3 \times 2 = 6$.

3 times 2 dots is written 3×2 dots, or 2 dots $\times$ 3.

2 dots $\times$ 3 is read 2 dots multiplied by 3.

The number we multiply by is called the **multiplier.**

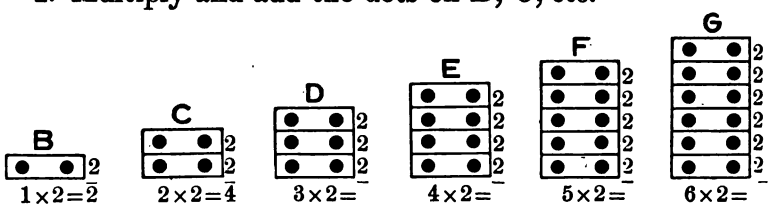


1. How many times 2 dots are there in card *A*? how many times 3 dots?
3×2 dots $= 2 \times$ how many dots?

2. How many times 2 dots are there on each card below?

Oral and Written Exercise

1. Multiply and add the dots on *B*, *C*, etc.



2. 4×2 dots $= 2 \times$ how many dots?

3. Which card shows that 5×2 dots $= 2 \times 5$ dots?

4. Which card shows that 2×6 dots $= 6 \times 2$ dots?

Read the following and give the products:

	a	*b*	*c*	*d*	*e*	*f*
5.	1×2 2×1	2×2	3×2 2×3	4×2 2×4	5×2 2×5	6×2 2×6

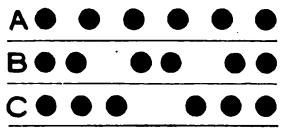
Oral Problems

1. In a window having 2 rows of 3 panes each there are —— panes of glass.

2. 4 oranges at 2 cents apiece cost —— times 2 cents, or —— cents.

3. We have —— toes on each foot. On 2 feet we have 2 times —— toes, or —— toes.

1. Count the dots in row *A*; in row *B*; in row *C*.



2. In 6 dots there are how many times 2 dots? how many times 3 dots?

Finding how many times one given number is contained in another given number is called **dividing**.

In dividing a number, the answer is called the **quotient**.

6 divided by 2 equals 3 may be written thus, $6 \div 2 = 3$.

The number we divide by is called the **divisor**.

Oral Exercise

Read and give the quotients:

	a	*b*	*c*	*d*
1.	$8 \div 2 = ?$	$8 \div 4 = ?$	$10 \div 2 = ?$	$10 \div 5 = ?$
2.	$6 \div 2 = ?$	$6 \div 3 = ?$	$4 \div 2 = ?$	$9 \div 3 = ?$
3.	$12 \div 2 = ?$	$12 \div 6 = ?$	$12 \div 3 = ?$	$12 \div 4 = ?$

4. If a rabbit goes 2 feet to each hop, to go 6 feet he makes —— hops.

5. Nellie set the table, putting on 2 spoons at each plate, and used 8 spoons. There were —— plates.

6. Mr. Pratt divided 12 apples among some boys, giving each boy 2 apples. There were —— boys.

7. With a 10-cent piece I can buy —— 2-cent stamps.

8. Mrs. Green has 12 yards of muslin. How many curtains can she make if she puts 2 yards into each?

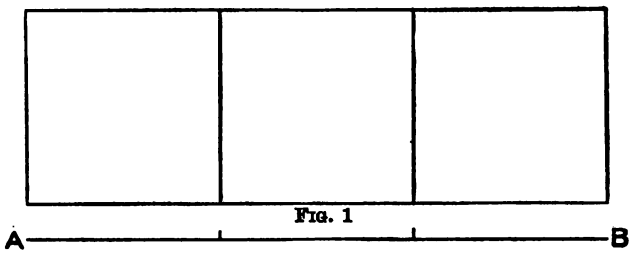


FIG. 1

Oral Exercise

1. The line AB is divided into —— equal parts.

2. Figure 1 is divided into —— equal parts.

When a thing is divided into three equal parts, we call each part *one third;* — we write it in figures $\frac{1}{3}$.

3. In Figure 1 there are —— square inches.

4. One square inch is $\frac{1}{3}$ of —— square inches.

5. 2 square inches are $\frac{2}{3}$ of —— square inches.

6. $\frac{1}{3}$ of 3 inches is —— inch.

7. $\frac{2}{3}$ of 3 inches are —— inches.

8. If you divide an apple into thirds, how many pieces will it make?

9. From a pound of candy I give Ralph $\frac{1}{3}$ of a pound and Rachel $\frac{1}{3}$ of a pound, and I have —— of a pound left.

NOTE. The teacher should give the pupils abundance of oral drill on fractions by means of objective work, *i.e.* by drawing, paper cutting, etc.

Oral Exercise

1. Cut a strip of paper 1 inch wide and 1 foot long.
2. Fold and cut the strip into thirds.
3. Measure the length of $\frac{1}{3}$ of the strip.
4. $\frac{1}{3}$ of a foot is —— inches.
5. Measure the length of $\frac{2}{3}$ of the strip.
6. $\frac{2}{3}$ of a foot equal —— inches.
7. Draw a line 9 inches long.
8. Measure the length of $\frac{1}{3}$ of the 9-inch line.
9. Measure the length of $\frac{2}{3}$ of the 9-inch line.
10. $\frac{1}{3}$ of 9 inches is —— inches.
11. $\frac{2}{3}$ of 9 inches are —— inches.
12. Draw a 6-inch line.
13. Find the length of $\frac{1}{3}$ of the 6-inch line.
14. Find the length of $\frac{2}{3}$ of the 6-inch line.
15. If $\frac{1}{3}$ of a 9-inch line is taken away,—— inches are left.
16. $\frac{1}{2}$ of a foot is —— inches. $\frac{1}{3}$ of a foot is —— inches.
17. $\frac{1}{2}$ of a foot is —— inches more than $\frac{1}{3}$ of a foot.

Written Exercise

Copy, and write the answers :

1. $\frac{1}{3}$ and $\frac{1}{3}$ = ——; $\frac{1}{3}$ and $\frac{1}{3}$ and $\frac{1}{3}$ = ——.

Supply the missing numbers.

2. $1 = \frac{}{3}$; $1 + \frac{1}{3} = 1\frac{}{3}$; $\frac{2}{3} - \frac{1}{3} =$ ——; $\frac{3}{3} - \frac{2}{3} = \frac{}{3}$.

Oral Problems

1 cent.

1 nickel = 5 cents.

1 dime = 2 nickels = 10 cents.

1 dollar = 10 dimes = 100 cents.

1. A nickel is equal to how many cents? It is also called a five-cent piece.

2. A dime is equal to how many cents? to how many 5-cent pieces?

3. A nickel or 5-cent piece is equal to what part of a dime? A dime is also called a 10-cent piece.

4. A dollar is equal to —— dimes or 10-cent pieces.

5. A top costs a nickel. A dime will buy —— tops.

6. If 1 car fare is 5 cents, you can get —— fares for a dime and a nickel.

7. A ball costs a dime. A dollar will buy —— balls.

8. An ounce of aster seeds costs 10 cents. A nickel will pay for —— of an ounce.

9. —— 1-cent newspapers are sold for a nickel.

10. If you give a nickel for a 2-cent paper, you receive —— cents in change.

11. If you give a dime for a pencil that costs a nickel, you receive —— in change.

12. If you give 2 nickels for a quart of milk that costs 6 cents, you receive —— in change.

Oral Problems

1. Jane buys a block of paper for 5 cents and a pencil for 2 cents. They all cost —— cents.

2. Fred has a dime and he buys an orange for 3 cents and a banana for 2 cents. What change does he get?

3. John had a dime and 1 cent. After paying 3 cents for some peaches, he had —— cents left.

4. 1 pound of tea costs a half dollar, 1 dollar will buy —— pounds.

5. At 2 dollars each, 5 hats will cost —— dollars. 6 hats will cost —— dollars. 4 hats —— dollars. 3 hats —— dollars.

Written and Sight Exercise

Copy, and write the answers:

Find the sums:

1.	2.	3.	4.
1 dollar	2 cents	2 dollars	4 cents
3 dollars	3 cents	1 dollar	2 cents
5 dollars	4 cents	2 dollars	1 cent
7 dollars	6 cents	3 dollars	9 cents

We may use ct. or ¢ for cent or cents, and $ for the word dollar or dollars, thus, we may write 2 cents, 2 ct., or 2¢; and 5 dollars, $ 5.

NOTE. The teacher should have many exercises in buying, selling, and making change, using either real or toy money.

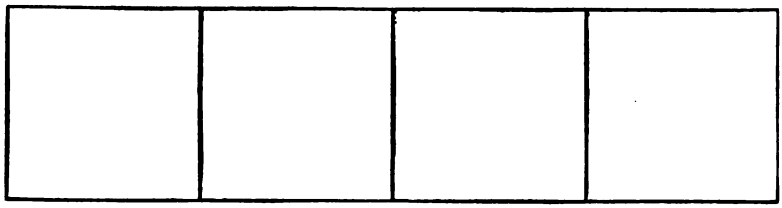


FIG. 1

1. Into how many equal parts has Figure 1 been divided by the vertical lines?

2. Into how many equal parts has the line AB been divided?

When a thing is divided into four equal parts, we call each part *one fourth* or one quarter.

3. If one half is written $\frac{1}{2}$, how do you think we should write one fourth? How do you read $\frac{1}{4}$?

4. Measure the line AB. $\frac{1}{4}$ of AB is how long?

5. How many fourths can be made of a whole thing?

6. If you divide an orange into 4 equal parts, what name will you give to each of the parts?

7. If you give away $\frac{1}{4}$ of the orange how many fourths will be left?

8. Fold a strip of paper into halves. Fold each half into halves. Open it and tell into how many equal parts the whole strip is divided. Name one of the parts; three of the parts.

Oral and Written Exercise

Copy the following and write the sums:

1.

3	4	5	6	7	8	9	10
10	9	8	7	6	5	4	3

2. Name each pair of numbers that makes 13.

Copy, and supply the missing numbers:

3.

10	9	4	8	5	7	6	3	2	11
+ 3	?	?	?	?	?	?	?	?	?
13	13	13	13	13	13	13	13	13	13

Copy and subtract:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
4.	3	13	13	11	11	12	12	13	13	13
	1	11	2	2	9	9	5	5	8	3
5.	1	11	12	13	13	11	13	11	12	13
	1	1	3	4	9	3	6	7	7	7
6.	11	11	12	11	12	13	11	13	12	12
	4	5	6	6	8	10	8	4	2	11

Copy and add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
7.	1	2	2	1	2	3	4	2	3	2
	3	4	5	4	8	3	4	4	2	1
	3	5	4	9	2	7	6	6	7	7
	7	4	4	4	3	6	3	7	4	5

Oral Exercise

1 quart equals 2 pints

Quart

Pint

1. Name some kind of liquid that is sold by the pint and quart.

2. How many pints make a quart? Then a pint is what part of a quart?

3. One quart equals how many pints?

4. One half a quart equals how many pints?

5. Two quarts equal how many pints?

6. One quart and one pint equal how many pints?

7. If a quart measure is full of milk, how much will be left when one pint is poured out?

8. How many pint jars can be filled from a quart jar of milk? from a two-quart jar?

9. What is $\frac{1}{3}$ of 3 quarts? of 6 quarts?

10. What is $\frac{1}{4}$ of 4 quarts? of 8 quarts? of 12 quarts?

11. Two quarts are how many times 1 pint?

12. One pint is what part of two quarts?

Learn to repeat:

1 quart = 2 pints,
1 pint = $\frac{1}{2}$ a quart.

We may write **pt.** for pint or pints and **qt.** for quart or quarts, thus: 3 quarts and 1 pint = 3 qt. and 1 pt.

NOTE. The teacher should give many problems similar to the foregoing and should have the pupils make frequent use of the measures.

Oral Problems

1. There are 3 quarts of water in a pail. If you measure it out in a pint dipper, you must fill the pint dipper —— times.

2. Into a pitcher containing 2 quarts of cream was poured 2 pints. There were —— quarts in the pitcher then.

3. I pour a pint of milk into a quart of cream. I now have —— pints.

4. The grocer brought me 2 quarts of oil. I filled the lamps, using 1 pint of the oil. —— pints are left.

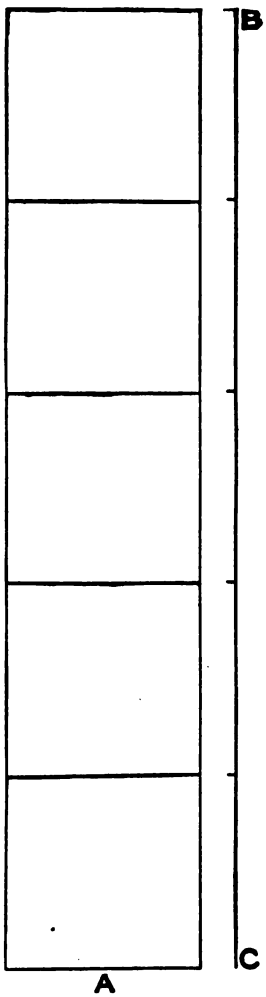
5. I buy 9 pints of peach preserves and use $\frac{1}{3}$ of them for lunch. I use —— pints. I use —— quarts.

Oral Exercise

(For dictation by the teacher)

What number

1.	added to	2	will make	8?	10?	12?	11?	9?
2.	added to	3	will make	9?	8?	10?	12?	11?
3.	added to	4	will make	10?	9?	12?	11?	8?
4.	added to	5	will make	9?	12?	8?	11?	10?
5.	added to	6	will make	8?	11?	9?	12?	10?
6.	added to	7	will make	11?	12?	8?	10?	9?
7.	added to	8	will make	10?	12?	9?	11?	13?
8.	added to	9	will make	12?	10?	11?	13?	19?
9.	added to	10	will make	12?	11?	13?	17?	18?



Oral Exercise

1. Measure the line BC. How long is it? Into how many equal parts has it been divided? How long is each part?

2. Figure A is —— inches long. It is —— inches wide. How many equal parts are made of it by the cross lines?

3. There are —— **fifths** in Figure A. In the line BC there are —— fifths.

4. Write one fifth. Two fifths.

5. Read $\frac{1}{5}$, $\frac{3}{5}$, $\frac{4}{5}$, $1\frac{1}{5}$.

6. A dollar is divided equally among 5 children. Each child receives —— of a dollar.

7. From a pound of tea $\frac{1}{5}$ of a pound is used. There remain —— of a pound.

8. $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}=\frac{}{5}$.

9. $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}=\frac{}{5}$.

10. $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=1\frac{}{2}$.

11. $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{}{4}$. $\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=\frac{}{3}$.

12. 1 = —— fourths.

13. $\frac{1}{2}$ = —— fourths.

14. 1 = —— thirds.

15. 1 = —— fifths. $1\frac{1}{5}=\frac{}{5}$.

Seat and Oral Exercise

1. Cut a strip of paper 1 inch wide and 3 feet long.

2. Lay the strip on the yard stick and see if they are equal in length.

3. The strip of paper is —— yard long.

4. The strip of paper is —— feet long.

3 feet = 1 yard.

We may write **yd.** for yard or yards; **ft.** for foot or feet; **in.** for inch or inches.

3 yards, 1 foot, 4 inches may be written 3 yd. 1 ft. 4 in.

5. Fold over 1 foot at each end of the paper strip.

6. Tell what part of a yard 1 ft. is; what part of a yard 2 ft. are.

1 ft. is —— of a yard; 2 ft. are —— of a yard.

7. How many feet are there in 2 yd.?

8. A square-cornered table is 1 yard long and 2 feet wide. The table is —— feet long. It is —— feet around the table.

9. How many feet are there in 3 ft. + 2 ft. + 1 ft.? How many yards are there?

10. How many yards long is a strip of carpet which measures 9 ft. in length?

11. A grass plot is 4 yd. wide. What is its width in ft.?

Oral Exercise

Add, and give answers orally to the following:

	a	*b*	*c*	*d*	*e*	*f*
1.	4 feet	10 inches	8 yards	2 in.	3 ft.	7 yd.
	6 feet	2 inches	5 yards	7 in.	8 ft.	6 yd.
	3 feet	3 inches	3 yards	4 in.	1 ft.	1 yd.

Subtract, and give answers orally:

	a	*b*	*c*	*d*	*e*	*f*
2.	8 yards	7 inches	9 feet	13 ft.	12 yd.	13 ft.
	6 yards	3 inches	5 feet	6 ft.	7 yd.	8 ft.

Read and give answers to the following:

3. 1 pt. + 2 pt. + 1 pt. = ——— pt.
4. 2 qt. + 1 qt. + 6 qt. = ——— qt.
5. 3 qt. + 8 qt. + 4 qt. = ——— qt.
6. 5 pt. + 6 pt. + 3 pt. = ——— pt.
7. 6 qt. − 4 qt. + 1 qt. = ——— qt.
8. 14 pt. − 7 pt. = ?
9. $\frac{1}{2}$ of 2 qt. = ?
10. $\frac{1}{3}$ of 3 qt. = ?
11. $\frac{1}{4}$ of 4 qt. = ?
12. $\frac{1}{4}$ of 2 qt. = ?

Written Exercise

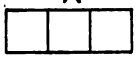
Copy, and add the following:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
2	2	2	2	3	4	2	2	3	2
0	1	1	2	1	0	1	4	4	0
1	2	2	1	2	2	2	2	2	4
2	5	6	6	7	4	5	9	6	8
9	7	6	7	6	7	8	3	5	5

Oral Exercise

1. How many squares are there in A? in B?

A

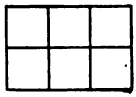


2. How many times 3 squares are there in B?

2 times 3 squares = ——

Show by the use of blocks that $2 \times 3 = 6$

B

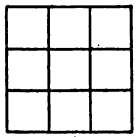


3. How many squares are there in C? how many times 3 squares?

3 times 3 squares = ——

Show by the use of blocks that $3 \times 3 = 9$

C

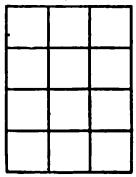


4. How many squares are there in D? how many times 3 squares?

4 times 3 squares = ——

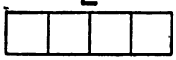
Show by the use of blocks that $4 \times 3 = 12$

D



5. How many squares are there in E?

E

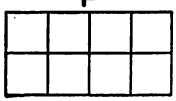


6. How many squares are there in F? how many times 4 squares?

2 times 4 squares = ——

Show by the use of blocks that $2 \times 4 = 8$

F

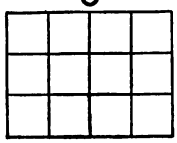


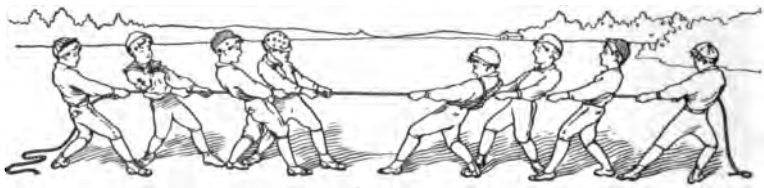
7. How many squares are there in G? how many times 4 squares?

3 times 4 squares = ——

Show by the use of blocks that $3 \times 4 = 12$

G





Oral Exercise

1. These boys are playing "Tug of War." How many boys are there on both sides? how many on each side?

2. One half of 8 boys are —— boys. $\frac{1}{2}$ of 8 = ——.

3. If 2 of the boys stop playing, what part of the 8 boys will that be? 2 is what part of 8?

4. ● ● ● ● Here are —— dots.

5. What is $\frac{1}{2}$ of 4? What is $\frac{1}{4}$ of 4?

6. ● ● ● ● ● ● Here are —— dots.

7. What is $\frac{1}{2}$ of 6?

8. ● ● ● ● ● ● ● ● What is $\frac{1}{2}$ of 8? $\frac{1}{4}$ of 8? $\frac{2}{4}$ of 8? $\frac{3}{4}$ of 8?

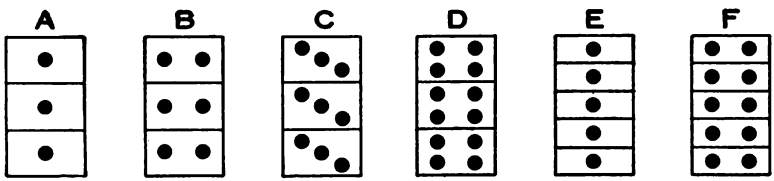
9. What is $\frac{1}{2}$ of 10?

Written Exercise

Copy the examples below, and write the answers:

	a	*b*	*c*	*d*
1.	$\frac{1}{2}$ of 2 = —	$\frac{1}{2}$ of 6 = —	$\frac{1}{2}$ of 10 = —	$\frac{3}{4}$ of 4 = —
2.	$\frac{1}{2}$ of 4 = —	$\frac{1}{2}$ of 8 = —	$\frac{1}{2}$ of 12 = —	$\frac{3}{4}$ of 8 = —
3.	$\frac{1}{4}$ of 4 = —	$\frac{1}{4}$ of 8 = —	$\frac{1}{4}$ of 12 = —	$\frac{3}{4}$ of 12 = —

Oral Exercise



1. How many dots are there in *A*? What is $\frac{1}{3}$ of 3 dots?
2. How many dots are there in *B*? What is $\frac{1}{3}$ of 6 dots?
3. How many dots are there in *C*? What is $\frac{1}{3}$ of 9 dots?
4. What is $\frac{1}{3}$ of 12 dots?
5. $\frac{2}{3}$ of 12 dots are how many dots?
6. $\frac{2}{3}$ of 3 dots are how many?
7. How many are $\frac{2}{3}$ of 6 dots? $\frac{2}{3}$ of 9 dots?
8. If we take away $\frac{1}{3}$ of 6 dots, how many are left?
9. How many dots are there in *E*? What is $\frac{1}{5}$ of 5 dots?
10. How many dots are there in *F*? $\frac{1}{5}$ of 10 dots = ?
11. How many are $\frac{1}{3}$ of 6? of 3? of 9? of 12?
12. How many are $\frac{1}{5}$ of 5? of 10?
13. How many are $\frac{1}{2}$ of 4? of 6? of 8? of 12?
14. How many are $\frac{1}{4}$ of 4? of 8? of 12?

Written Exercise

Show by drawings what each of the following equals:

	a	*b*	*c*	*d*
1.	$\frac{1}{3}$ of 3 =	$\frac{1}{3}$ of 6 =	$\frac{1}{3}$ of 9 =	$\frac{1}{3}$ of 12 =
2.	$\frac{1}{5}$ of 10 =	$\frac{1}{2}$ of 8 =	$\frac{1}{4}$ of 8 =	$\frac{1}{4}$ of 12 =

Oral and Written Exercise

Copy the following and write the sums:

1.	4	5	6	7	8	9	10	11
	10	9	8	7	6	5	4	3

Copy, and supply the missing numbers:

2.	10	9	5	8	6	7	4	11
	+4	?	?	?	?	?	?	?
	14	14	14	14	14	14	14	14

Give remainders at sight, or copy and write:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
3.	14	14	14	12	14	14	14	12	13	14
	9	4	5	5	3	8	6	7	7	7
4.	12	13	14	12	13	11	12	13	11	13
	9	9	10	4	4	4	6	5	5	6

Copy and add, writing the sums:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
5.	1	1	2	2	2	5	3	4	4	2
	1	2	1	2	3	1	1	2	3	4
	7	8	7	6	6	5	5	4	4	6
	7	6	6	6	5	9	8	8	7	8
6.	2	2	3	2	4	2	4	3	3	2
	2	3	1	3	3	3	4	0	1	1
	9	9	8	8	9	7	7	5	6	9
	5	2	5	6	4	7	4	9	8	5

Oral Exercise

1. Making use of the numbers written in the white ring of the circle, begin with 7, and going around the circle in either direction, add to 6 each number, thus, $6 + 7$, $6 + 2$, $6 + 4$, $6 + 3$, etc.

NOTE. A device for rapid blackboard drill in addition and subtraction may be made by the teacher as follows:

Upon a large sheet of oak tag or chart paper, draw a circle about 2 feet in diameter. Inscribe another circle on the same center with a diameter of 1 foot. Cut out the inscribed circle, and upon the ring thus left, write the figures from 0 to 9, sufficiently large to be seen plainly across the room.

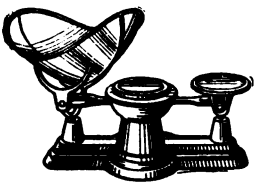
Hang up this chart at any conspicuous place against the blackboard, which will show in the center of the chart. A figure and a sign to indicate the operation may be written with crayon. Both figure and sign may be changed at will by use of the eraser and crayon.

The same device may be used with combinations of numbers above 9, *e.g.* $10 + 5$, $14 - 8$, etc. It will be well to make more than one such chart, varying the order of the figures.

Copy, and supply the missing numbers:

2.	5	6	7	8	9	10	8	7	9	6
	+10	9	8	7	6	?	?	?	?	?
	?	?	?	?	?	15	15	15	15	15

3. Name in order each pair of numbers that makes 15.



A 1 pound weight

A ½ pound weight

A ¼ pound weight

Oral Exercise

1. Name some things that are sold by the pound (like tea, sugar, etc.).

2. How many of the ½ pound weights will balance the 1 pound?

3. How many of the ¼ pound weights will balance the 1 pound? the ½ pound?

4. The ¼ pound is what part of a ½ pound?

5. How many ½ pound packages can be made from 1 pound of coffee?

6. If a pound of nuts costs 10 ¢, how much will 5 ¢ buy?

7. If a pint of water weighs 1 pound, how many pints of water will weigh 2 pounds? how many quarts? How many quarts will weigh 4 pounds?

8. How many ½ pound weights will balance a package that weighs $1\frac{1}{2}$ pounds?

We may write **lb.** for pound or pounds; **oz.** for ounce or ounces.

9. Add: 1 lb. + 3 lb. + 5 lb.; 4 lb. + 2 lb. + ½ lb.

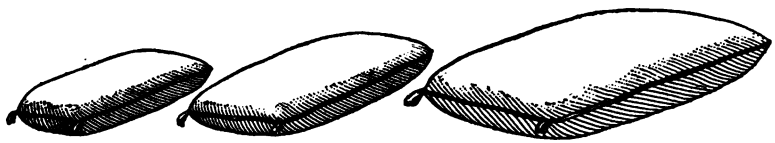
10. Subtract: 9 lb. − 4 lb.; 6 lb. − 3 lb.; 1 lb. − ½ lb.; 8 lb. − ½ lb.; 5 lb. − ¼ lb.; $1\frac{1}{2}$ lb. − ½ lb.

Some things are weighed in pounds and ounces:

11. Baby weighs 8 lb. 8 oz.
Her carriage, 3 lb. 6 oz.
Both weigh —lb. —oz.

12. Ed weighs 12 lb. 10 oz.
His coat, 1 lb. 6 oz.
Both weigh —lb. 0 oz.

NOTE. The school should be provided with a set of simple balances like those in the picture opposite, with the pound, $\frac{1}{2}$ pound, and $\frac{1}{4}$ pound weights. Shot bags weighing 1 pound, $\frac{1}{2}$ pound, and $\frac{1}{4}$ pound, like those shown in the picture, may be used. The teacher can easily make these. There should be much use of these weights and balances in weighing various objects and materials. The children should learn to do the weighing for themselves.



$\frac{1}{4}$ POUND $\frac{1}{2}$ POUND 1 POUND

Oral Problems

1. These columns show the number of ounces in 1 lb. and in parts of 1 pound. Add each column and tell which shows the number of oz. in 1 lb.; in $\frac{1}{2}$ lb.; in $\frac{1}{4}$ lb.; in $\frac{3}{4}$ lb.

Ounces.			
4			
4	4		
4	4	4	
4	4	4	4

2. What is the weight of a parcel containing $\frac{1}{2}$ a pound of raisins and $\frac{1}{2}$ a pound of figs?

3. A pound of candy costs 12 cents. How much will $\frac{1}{3}$ of a pound cost?

4. Half of a melon weighs $\frac{1}{2}$ a pound. How much does the whole melon weigh?

5. Susan uses $\frac{1}{4}$ lb. of butter, and $\frac{1}{2}$ lb. of nuts in making candy. How many ounces of both does she use?

6. Fred bought a pound and a half of nuts at 12 cents a pound. How much did they cost?

Oral Problems

1. If 1 pound of butter costs 20 cents, how much will $\frac{1}{2}$ a pound cost? How much will $\frac{1}{4}$ of a pound cost?

2. If the grocer weighs out a pound and a half of rice, what weights can he use?

3. I bought a 6 pound box of salt at 2 cents a pound. How much did it cost? How much would a half box cost?

4. I buy 2 pounds of meat at 6 cents a pound. Find the cost. I give the dealer a nickel and a dime to pay for it. How much change does he give me?

5. You buy of your grocer 1 pound of prunes for 10 cents and 2 pounds of sugar at 6 cents a pound and give 2 dimes to pay for them. How much change should you receive?

Written and Sight Exercise

Subtract:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	15	15	15	15	15	15	15	15	15	15
	−10	5	9	6	8	7	1	11	14	4
2.	15	15	15	15	14	14	14	14	13	13
	−12	2	13	3	7	5	9	6	9	5

Add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
3.	8	6	9	5	7	2	5	6	5	7
	2	2	3	4	3	8	3	5	5	5
	4	7	3	6	4	7	5	2	4	3

Written and Sight Exercise

Copy the following and write the sums:

1.	6	7	8	9	7	8	9	8	9	9
	10	9	8	7	10	9	8	10	9	10

2. Name in order each pair of numbers that makes 16.
3. 9 with what number makes 16? 17? 18?
4. 8 with what number makes 16? 18? 17?
5. 7 with what number makes 16? 15? 12? 14?

Subtract:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
6.	16	16	16	16	17	17	15	14	15	18
	10	8	7	9	9	8	7	9	8	9
7.	18	14	15	15	16	14	14	15	18	17
	10	5	6	8	6	7	8	9	8	7

Add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
8.	3	0	4	1	2	2	2	9	2	2
	8	3	0	6	5	1	2	0	2	3
	4	7	9	9	5	8	6	8	7	5
	4	10	7	3	8	9	10	3	9	9
9.	1	1	1	1	9	2	2	1	5	2
	8	2	8	9	1	9	9	6	5	7
	4	9	3	5	2	7	1	7	2	6
	6	8	5	4	3	3	6	2	7	2

Oral Problems

1. I paid 5 cents for a loaf of bread. How many cents would 2 loaves have cost me?

2. I buy 2 oranges for 3 cents each and give the dealer a dime. How much change should he give me?

3. If I owe you 7 cents and give you a dime, how much should you give me?

4. Mary bought a corn ball for 3 cents and a stick of candy for 1 cent. She gave the clerk a 5 cent piece. How much change should he give her?

5. Fred gave a dime for a top and some marbles. The marbles cost 3 cents. How much did the top cost?

6. George had 9 pennies and a nickel. How much money did he have?

7. I have a dime, Jennie has a 5 cent piece, and Fred has 2 cents. If we put our money together, how many cents shall we have?

8. I go to the store with a dime and four cents. I spend half of my money. How much do I spend?

9. If I buy a ball and receive 3 cents change from a dime and a nickel, how much does the ball cost?

How many cents are there:

10. In $\frac{1}{2}$ a dime? in two 5 cent pieces?

11. In 2 nickels and 2 cents?

12. In two 5 cent pieces and 6 cents?

13. In 1 dime and 3 cents?

14. In 1 dime, 1 nickel, and 4 cents?

Oral Problems

1. An 8 inch line is —— inches shorter than a 12 inch line.

2. A 12 inch line is —— inches longer than a 3 inch line.

3. A 13 foot fishing rod breaks off 4 feet from the end. Then it is —— feet long.

4. If supper time is 6 o'clock and bed time is 3 hours later, what is bed time?

5. School begins at 9 o'clock and closes at 12 o'clock. The session is —— hours long.

6. Draw a line 7 inches long. Draw one 8 inches longer. How long is the second line?

7. How many more cents are there in 2 dimes than in a 5 cent piece?

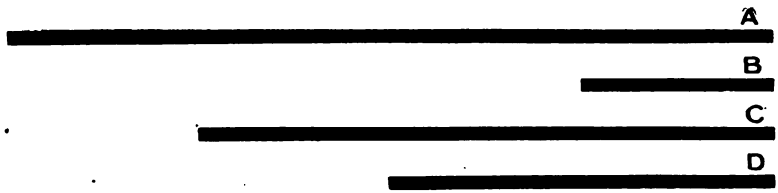
8. How much more must be paid for a 15 cent top than for a 6 cent pencil?

9. Which would cost the more, a picture book at 17 cents or a box of candy at 20 cents? How much more would it cost?

10. I can walk 4 miles in an hour. On a bicycle I can ride 11 miles in an hour. In one hour I can ride on the bicycle —— miles farther than I can walk.

11. Which is the cheaper chair, one for 16 dollars or one for 12 dollars? How much cheaper is it?

12. Ira cut off 10 feet from a board, and then had 10 feet left. How many feet long was the board at first?



NOTE. Each pupil should be provided with a foot ruler, and with either a yard stick or a piece of twine 1 yard long marked off into feet.

Oral Exercise

1. How many inches long is line *A*? How long are lines *A* and *B* together? *C* and *D* together? *C* and *B* together? *B* and *D* together?

2. How much longer is *A* than *B*? *D* is how much shorter than *C*?

3. Using your foot ruler, measure the length of the shortest blackboard in the room.

4. Measure the length of the longest blackboard.

5. Measure and find the length, the width, and the height of the teacher's desk.

6. How many feet are there in 1 yard? in 2 yards? in 3 yards?

7. In 12 feet there are how many yards?

8. How tall is the shortest girl in the room?

9. How tall is the tallest boy in the room?

10. Using a yard or a foot measure, find the length of the schoolroom. Find its width.

11. How many inches can you span from the end of your thumb to the end of your little finger?

Written Problems

1. Isaac's fish pole is 3 yards long and his line is 10 yards long. What is the length of both together?

2. Henry's step is 2 feet long, and he takes 6 steps in going from his desk to the teacher. How many feet does he go?

3. A foot rule is made to fold into 4 equal parts, and one of the parts is broken off. How long is that part?

4. To frame a picture it takes 5 feet for the two ends and 7 feet for the two sides. How much does it take for the whole frame?

5. Roger tied two pieces of twine together for a kite line. One end measured 9 yards from the knot, and the other end measured 8 yards. How long was his line?

6. Grace can reach up $4\frac{1}{2}$ feet. How high can she reach when she stands on a cricket 6 inches high?

7. In a schoolroom it is 7 feet to the top of a blackboard and 5 feet more to the ceiling. How many feet high is the room?

8. A teacher is $5\frac{1}{2}$ feet tall, and the top of her blackboard is 2 feet higher than her head. How high is the top of the blackboard from the floor?

9. Olive binds a square-cornered mat for her mother; the mat is 2 yards long and 1 yard wide. How many yards of binding must she use?

10. How much binding must you use to bind a square mat measuring 2 yards on each side?

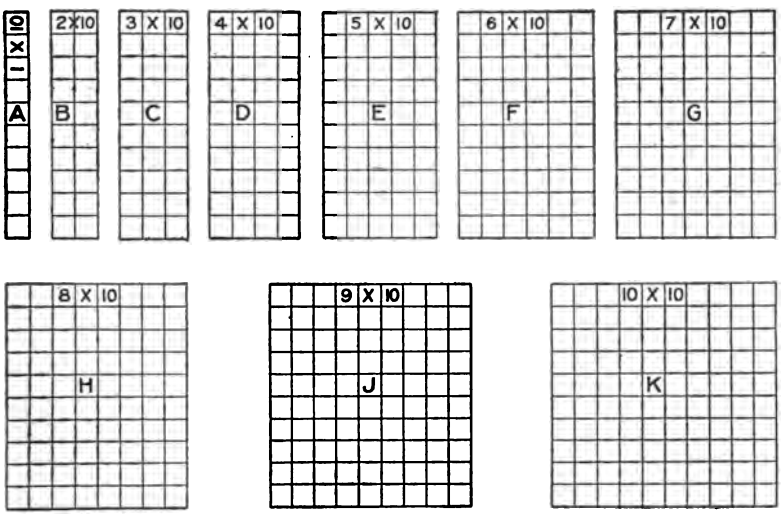
Drill Table for Practice in Addition and Subtraction

1.	1		11.	1	2	3	4	5	6	7	8	9	10
	0			10	9	8	7	6	5	4	3	2	1
2.	1		12.		2	3	4	5	6	7	8	9	10
	1				10	9	8	7	6	5	4	3	2
3.	1	2	13.			3	4	5	6	7	8	9	10
	2	1				10	9	8	7	6	5	4	3
4.	1	2	3	14.			4	5	6	7	8	9	10
	3	2	1				10	9	8	7	6	5	4
5.	1	2	3	4	15.			5	6	7	8	9	10
	4	3	2	1				10	9	8	7	6	5
6.	1	2	3	4	5	16.			6	7	8	9	10
	5	4	3	2	1				10	9	8	7	6
7.	1	2	3	4	5	6	17.			7	8	9	10
	6	5	4	3	2	1				10	9	8	7
8.	1	2	3	4	5	6	7	18.			8	9	10
	7	6	5	4	3	2	1				10	9	8
9.	1	2	3	4	5	6	7	8	19.			9	10
	8	7	6	5	4	3	2	1				10	9
10.	1	2	3	4	5	6	7	8	9	20.			10
	9	8	7	6	5	4	3	2	1				10

NOTE. The combinations on this page should be thoroughly mastered. They are the basis of all arithmetical operations. The table should be enlarged for a wall chart.

PART II

COUNTING BY TENS



Oral Exercise

1. Count the desks in the schoolroom.
2. How many squares are there in A? in B? C? etc.
3. A has 10 squares, B has —— times 10 squares; C has —— times 10 squares; D has —— times 10 squares, etc.
4. How many 10's are there in D? in $A + B$? etc.

Oral Exercise

1. $10+10=$ ——. Two 10's = ——.
2. $10+10+10=$ ——. Three 10's = ——.
3. $10+10=$ ——. $20+10=$ ——. $30+10=$ ——.
4. $40+10=$ ——. $50+10=$ ——. $60+10=$ ——.
5. $70+10=$ ——. $80+10=$ ——. $90+10=$ ——.

6. In 40 there are —— 10's.
7. In 60 there are —— 10's.
8. In 30 there are —— 10's.
9. In 80 there are —— 10's.
10. In 50 there are —— 10's.
11. In 70 there are —— 10's.
12. In 90 there are —— 10's.
13. In 100 there are —— 10's.

14. Count by 10's from 10 to 100, and back.

Add at sight :

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*
15.	1	10	2	20	3	30	4	40	5	50	6	60
	1	10	2	20	3	30	4	40	5	50	6	60
16.	2	20	3	30	4	40	5	50	6	60	7	70
	1	10	1	10	1	10	1	10	1	10	1	10
17.	8	80	9	90	3	30	2	20	4	40	5	50
	1	10	1	10	2	20	4	40	3	30	2	20
18.	6	60	7	70	8	80	3	30	5	50	6	60
	2	20	2	20	2	20	4	40	4	40	4	40

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
19.	10	40	30	50	80	40	20	30	10	50
	40	40	10	20	10	10	60	10	40	40
	20	10	40	30	10	50	10	20	30	10

Oral Exercise

Subtract at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	2	20	7	70	3	30	50	60	70	80
	1	10	1	10	2	20	20	20	20	20
2.	5	50	8	80	5	50	60	70	80	90
	3	30	3	30	4	40	40	40	40	40

Multiply rapidly at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
3.	1	10	2	20	3	30	5	50	6	60
by	2	2	2	2	2	2	2	2	2	2
4.	1	10	2	20	3	30	2	20	2	20
by	3	3	3	3	3	3	4	4	5	5
5.	1	10	1	10	1	10	7	70	4	40
by	8	8	9	9	10	10	1	1	2	2

Give the answers at sight:

6. $\frac{1}{2}$ of 2 =	7. $\frac{1}{2}$ of 4 =	8. $\frac{1}{2}$ of 8 =
$\frac{1}{2}$ of 20 =	$\frac{1}{2}$ of 40 =	$\frac{1}{2}$ of 80 =
9. $\frac{1}{2}$ of 6 =	10. $\frac{1}{2}$ of 10 =	11. $\frac{1}{3}$ of 3 =
$\frac{1}{2}$ of 60 =	$\frac{1}{2}$ of 100 =	$\frac{1}{3}$ of 30 =
12. $\frac{1}{3}$ of 6 =	13. $\frac{1}{3}$ of 9 =	14. $\frac{1}{4}$ of 4 =
$\frac{1}{3}$ of 60 =	$\frac{1}{3}$ of 90 =	$\frac{1}{4}$ of 40 =
15. $\frac{1}{4}$ of 8 =	16. $\frac{1}{5}$ of 5 =	17. $\frac{1}{5}$ of 10 =
$\frac{1}{4}$ of 80 =	$\frac{1}{5}$ of 50 =	$\frac{1}{5}$ of 100 =

Oral Problems

1. In one dime there are 10 cents. In 3 dimes there are —— cents.

2. If a man works 10 hours each day, in 4 days he works —— hours.

3. I have 80 cents. If I spend 20 cents I have —— cents left.

4. A rope is 50 feet long. If 10 feet are cut off, what part of the whole is cut off?

5. There are 20 rooms in a house. One half of the rooms are on the first floor and one half on the second floor. How many are on each floor?

6. A building has 10 windows on each side. How many are on all four sides?

7. It is 60 miles from H—— to B——. $\frac{1}{2}$ of the distance is —— miles. $\frac{1}{3}$ of the distance is —— ——.

8. At 10 cents a quart, 7 quarts of berries will cost —— cents. How much will 8 quarts cost? 9 quarts? 10 quarts?

9. A car holds 80 passengers. $\frac{1}{4}$ of the passengers get out. How many are left in the car?

10. A farmer had 90 sheep and lost $\frac{1}{3}$ of them. How many did he lose? How many were left?

11. 10 is $\frac{1}{2}$ of ——, $\frac{1}{3}$ of ——, $\frac{1}{4}$ of ——, $\frac{1}{5}$ of ——.

12. 20 is $\frac{1}{2}$ of ——, $\frac{1}{3}$ of ——, $\frac{1}{4}$ of ——, $\frac{1}{5}$ of ——.

13. A square room is 10 feet on each side. How far is it around the four sides?

Table of 10's

$1 \times 10 = 10$
$2 \times 10 = 20$
$3 \times 10 = 30$
$4 \times 10 = 40$
$5 \times 10 = 50$
$6 \times 10 = 60$
$7 \times 10 = 70$
$8 \times 10 = 80$
$9 \times 10 = 90$
$10 \times 10 = 100$

Oral Exercise

1. Read the table of 10's;

Thus: One 10 is 10, two 10's are 20; or, once 10 is 10, 2 times 10 are 20, etc.

2. Repeat the table from memory.

Give products rapidly at sight:

	a.	*b.*	*c.*
3.	2×10	3×10	5×10
4.	4×10	6×10	10×10
5.	8×10	9×10	7×10

6. There are 10 pencils in one box. In 6 boxes there are —— pencils.

7. Harry earns 10 cents a day. In 5 days he earns —— cents.

8. In 50 there are —— 10's. In 60 there are —— 10's. In 70 there are —— 10's.

9. A 10 story block has 10 windows on the front for each story. How many windows are there in all?

10. How many are there in the lower two stories? in the upper three stories? in the other 5 stories?

Written Exercise

Copy, and write the products:

	a	*b*	*c*
1.	$10 \times 4 =$ ——	$10 \times 7 =$ ——	$10 \times 8 =$ ——
2.	$10 \times 6 =$ ——	$10 \times 9 =$ ——	$10 \times 2 =$ ——
3.	$10 \times 3 =$ ——	$10 \times 5 =$ ——	$10 \times 10 =$ ——

Make upon paper a number table like the one below, filling the blank spaces from left to right by the addition of 10 to each preceding number.

Counting Table

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*
0	10	20		40		60			90	100
1	11		31		51					101
2		22					72			102
3	13		33							103
4	14	24		44						104
5	15		35			65				105
6		26								106
7	17		37	47					97	107
8	18	28						88		109
9			39		59					108

Oral Exercise

1. Read the following: 75, 34, 89, 42, 67, 28, 56, 99.

2. How many do you add to 0 to make 10? how many to 1 to make 11? to 2 to make 12? to each number in column *a* to make the corresponding number in *b*?

3. Beginning at 1 read across by line 1 to 101. Each number is how much greater than the one before it?

4. Begin at 2 and to each number across the line add 5; add 9; 10; 8.

Oral Exercise

1. Begin at 3 and to each number across the line add 6; add 5; 8; 7; 9. Begin at 5, and add 7; add 5; 6; 10.

2. Begin at 4 and to each number across the line add 7; add 9; 6; 8; 10. Begin at 6 and add 5; add 6; 8; 7.

3. Begin at 7 and to each number across the line add 3; add 5; 4; 10; 6.

4. Begin at 8 and to each number across the line add 3; 6; 4; 5; 8; 9; 7.

5. From each number at the right of 8 subtract 2; subtract 4; 5; 7; 10; 8; 1; 11.

6. From each number at the right of 9 subtract 3; subtract 5; 6; 4; 9; 10; 1; 11.

7. From each number at the right of 10 subtract 2; 10; 5; 1; 11.

8. From each number at the right of 1 subtract 8; 5; 7; 6; 4; 9. From each number at the right of 2 subtract 8; 4; 9; 5; 6; 7.

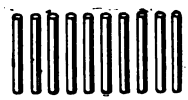
Written Exercise

Add:

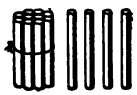
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
4	3	6	6	3	3	6	7	7	7
2	2	2	2	3	3	4	3	3	3
5	2	4	4	3	3	7	5	5	8
10	11	8	18	9	29	5	6	46	43

NOTE. 1 to 8 above are sample exercises for occasional drills. The teacher will find it a help to have the Counting Table upon the blackboard.

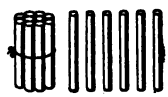
Oral Exercise *



Ten ones = 1 ten



10 + 4 = 14
1 ten and 4 = 14



10 + 6 = 16
1 ten and 6 = 16

1. Which figure in 14 shows how many ones there are in 14?

2. Which figure shows how many tens there are in 14?

3. Which figure in 16 stands for ones? for tens?

Written Exercise

Copy and complete:

1. 1 ten and 4 ones = ——
2. 2 tens and 3 ones = ——
3. 3 tens and 2 ones = ——
4. 4 tens + 6 = ——
5. 6 tens + 5 = ——
6. 8 tens + 7 = ——

Write these numbers as tens and ones, using signs:

7. 31 55 15 62 28 37 83 48
8. 60 59 96 69 90 63 57 88

9. Write in figures: eighteen, twenty-nine, forty-seven, sixty-two, thirteen, seventy-one, eighty, ninety-four, thirty-six.

* NOTE. The exercise will suggest to the teacher the oral teaching.

Table for Drill in Addition and Subtraction

a.	1	31	51	11	41	21	71	61	81	91
b.	2	22	62	82	12	52	72	32	92	42
c.	3	33	13	23	63	93	43	83	53	73
d.	4	44	24	54	34	14	74	64	84	94
e.	5	25	65	15	75	35	85	45	95	55
f.	6	36	56	46	16	76	26	66	86	96
g.	7	47	67	27	97	37	57	17	87	77
h.	8	58	28	48	68	18	78	38	98	88
i.	9	29	69	39	79	49	89	59	19	99
j.	10	20	80	50	60	70	30	90	40	100

Oral Exercise

1. To each number in line *a* add 2. In the same way add 3, 4, 5, 6, 7, 8, 9..

2. In the same way add 2, 3, 4, 5, 6, 7, 8, 9, to each number in lines *b, c, d, e, f, g, h, i, j.*

3. Beginning with the second column of figures from each number in line *a* take 2. Then take 3, then 4, 5, 6, 7, 8, 9.

4. In the same way, beginning with the second column, take 2, 3, 4, 5, 6, 7, 8, 9, from each number in lines *b, c, d, e, f, g, h, i, j.*

NOTE. The pupil should have drill upon the above table or upon the Counting Table, page 62, for a few minutes each day till the results of the combinations come to his mind instantly. A chart corresponding to the above table written on the blackboard or on chart paper will be found to be useful for class drill.

Oral Exercise

1. To make 13, what number must be added to 10? to 9? to 8? to 7? to 6? to 5? to 4?

2. Count by 10's from 9 to 99; from 7 to 97.

Add, observing the right-hand figure in each series:

	a	*b*	*c*	*d*	*e*
3.	9+4	8+5	7+6	5+8	5+7
	19+4	18+5	17+6	15+8	15+7
	49+4	58+5	47+6	35+8	75+7

4. What is the right-hand figure of the sum when we add 4 to a number ending in 9? 7? 8? 6?

5. What is the right-hand figure when we add 5 to a number ending in 7? 6? 8? 5? 9? When we add 6 to each?

In the following give the sums rapidly:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
6.	5	5	4	6	6	7	8	9
	28	47	59	87	76	86	45	44

Give rapidly the remainders in the following:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
7.	11	13	13	13	13	12	13	13
	−8	−9	−8	−6	−5	−7	−4	−7
8.	21	23	33	63	43	52	73	43
	−8	−9	−8	−6	−5	−7	−4	−7

Oral Problems

1. Jennie found 11 eggs in one nest and 8 in another. How many did she find in all?

2. Maud spent 5 cents and had 38 cents left. How many cents had she at first?

3. Joseph has a collection of 84 stamps. If he buys 9 more, how many will he then have?

4. Elsie weighed 52 pounds last year, but she weighs 9 pounds more this year. What is her weight?

5. Bert is 7 years old and his mother is 37. How old will Bert be in 6 years? How old will his mother be?

How many are:

6. 20 feet and 6 feet?
7. 28 boys and 5 boys?
8. 7 quarts and 4 quarts?
9. 17 quarts and 4 quarts?
10. 6 inches and 7 inches?
11. 46 inches and 7 inches?
12. 5 cents and 8 cents?
13. 35 cents and 8 cents?

Have the pupils make up problems for the following:

	a	*b*	*c*	*d*	*e*
14.	20 + 3	6 + 2	48 + 2	8 + 60	27 + 6
15.	18 + 2	70 + 6	63 + 6	16 + 3	28 + 5

Written Exercise

Add:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
5	7	7	8	6	9	8	9	6	9
5	5	8	4	6	5	4	7	8	7
16	18	14	19	27	37	41	44	54	66

Written Problems

Illustrative Example. How many are 23 books + 14 books?

TEACHER'S EXPLANATION. We write the numbers to be added so that the ones are in one column and the tens in another column.

WORK

$$\begin{array}{r} 23 \\ 14 \\ \hline 37 \end{array}$$

4 ones and 3 ones are 7 ones. We write 7 under the line directly beneath the ones that we have added. 1 ten and 2 tens are 3 tens. We write 3 under the line directly beneath the tens that we have added. Then 23 books + 14 books = 37 books. *Ans.* 37 books.

1. There are 52 weeks in a year, and 13 weeks in a quarter of a year. How many weeks are there in a year and a quarter?

2. Sara has 14 quarts of blueberries and her sister has 15 quarts. How many have both?

3. John has 13 white hens and 24 brown ones. How many hens has he?

4. If the cost of a pair of skates is 60 cents and the straps cost 15 cents extra, what is the cost of skates and straps together?

5. If Marguerite caught 18 pickerel and her father caught 11, how many did they catch together?

6. James bought a saw for 80 cents and a hammer for 35 cents. How much did both cost?

7. How much do I pay in all, if I buy a pint of oysters for 20 cents and a pound of crackers for 12 cents?

Written Exercise

Add:

	a	*b*	*c*
1.	16 feet	23 inches	45 yards
	13 feet	6 inches	11 yards
	10 feet	10 inches	12 yards

	a	*b*	*c*	*d*	*e*	*f*	*g*
2.	26	34	16	64	76	37	24
	21	24	23	25	13	32	40
3.	32	14	13	24	32	22	22
	24	33	12	25	53	30	30
	30	50	22	10	12	46	44
4.	11	33	65	73	51	35	90
	55	34	22	30	30	3	40
	13	10	72	62	76	80	16
	40	92	10	10	22	11	53
5.	72	50	41	51	5	60	41
	42	2	23	32	91	10	10
	3	23	84	73	52	40	5
	11	61	10	23	20	45	32
	21	43	10	10	41	22	70

6. There are 23 cows in the barn, 14 in the yard, and 12 in the road. How many are there in all?

7. After spending $25 and $40 Mr. Frost has $34 left. How much had he at first?

Written Problems

Illustrative Example. From 45 take 23. How many are left?

WORK

$$\begin{array}{r} 45 \\ 23 \\ \hline 22 \end{array}$$

TEACHER'S EXPLANATION. We take 3 ones from 5 ones and 2 ones remain. We write 2 under the line in the ones' place. We take 2 tens from 4 tens, and 2 tens remain. We write 2 under the line in the tens' place. $45 - 23 = 22$. *Ans.* 22.

Another method is this: 3 ones and 2 ones more make 5 ones. Write 2 in the ones' place under the line. 2 tens and 2 tens more make 4 tens. Write 2 in the tens' place under the line. Either method is satisfactory, but only one of the two should be used.

1. From 54 take 42. From 87 take 56.

2. A boy earned 85 cents and spent 23 cents. How many cents had he left?

3. Edith had 66 cents in her purse. She paid 50 cents for a handkerchief. How much money had she left?

4. A pair of rubbers costs 65¢. If I have only 40¢, how much more do I need to pay for a pair?

5. Albert earned $24 during his vacation. How much more must he earn in order to buy a bicycle for $35?

6. Alice's mother gives her 75¢ a week for dusting the furniture. If she puts 15¢ in the contribution box on Sunday, how much has she left?

7. Thomas has saved $37. He takes $16 to pay for an overcoat. How much has he left?

Written and Sight Exercise

Subtract:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	39	48	86	84	44	55	73	66
	13	15	31	13	24	14	52	22
2.	73	95	86	95	87	63	75	84
	13	44	55	41	22	32	13	52
3.	25	76	75	58	58	84	89	99
	12	34	63	36	35	53	44	47
4.	62	75	54	84	93	84	75	93
	21	42	23	72	82	20	20	50
5.	78	94	88	47	93	93	65	99
	13	14	52	10	12	51	34	16

Add at sight:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
6.	9	6	8	5	4	9	4	3
	14	26	25	18	38	9	39	59
7.	3	6	8	9	5	4	8	8
	5	4	9	8	7	5	6	5
	24	33	24	34	24	24	54	48

8. Take 10 dollars from 65 dollars. How many dollars are left?

9. How much better off is Frank, who has 18 cents, than Will, who has 13 cents?

Oral Problems

1. Max has 25¢. If he spends 15¢ for candy, how much will he have left for a ball?

2. From a crate of berries containing 36 quarts, 10 quarts were thrown away. How many quarts were left?

3. Out of 13 bushels of apples, 7 bushels were sold. There are —— bushels left.

4. The American flag has 13 stripes. 6 stripes are white. —— stripes are red.

5. Of a school of 33 pupils 7 are absent. There are —— pupils present.

6. Of a flock of 43 geese 7 are sold. There are —— geese left.

7. There are 23 tons of coal in a bin. After using 8 tons —— tons will remain.

Written Problems

1. I give 75 cents to pay for 52 cents worth of meat. What change should I receive?

2. At noon the temperature was 96 degrees. At night it was 75 degrees. How many degrees lower was it at night?

3. Fred and his dog together weigh 49 pounds. Fred weighs 34 pounds. How much does the dog weigh?

4. Russell paid 35 cents in one week for feed for his hens. He sold eggs for 87 cents. How much did he gain?

Oral and Written Exercise

1. To make 14 what number must be added to 10? to 9? to 8? to 7? to 6? to 5?

Add, observing the units', or ones', figure in each series:

	a	*b*	*c*	*d*	*e*
2.	9+5	5+9	8+6	7+7	6+8
	19+5	15+9	18+6	27+7	16+8
	29+5	35+9	48+6	57+7	66+8

What is the right-hand figure of the sum —

3. When we add 5 to a number ending in 9? 7? 8? 6?
4. When we add 6 to a number ending in 8? 5? 6? 7?
5. When we add 7 to a number ending in 7? 5? 6? 4?
6. When we add 8 to a number ending in 6? 3? 5? 4?
7. When we add 9 to a number ending in 5? 3? 4? 2?

In the following give the sums rapidly:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
8.	5	4	6	7	8	7	9	9
	19	29	38	27	46	46	34	55

Give rapidly the remainders in the following:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
9.	14	13	13	14	14	14	11	14
	−8	−8	−7	−9	−6	−7	−7	−5
10.	24	23	33	34	44	54	61	94
	−8	−8	−7	−9	−6	−7	−7	−5

Oral Exercise

NOTE. A figure similar to this may be placed by the teacher upon the blackboard for variety in the drill work upon addition and subtraction. The order of the figures in the margin and the figure in the center should be changed often. Point to the figure in the margin and call for the sum or the difference when taken with the figure in the center.

Written and Sight Exercise

Copy and subtract, writing the remainders:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	11	11	12	13	13	14	14	15	15	11
	2	9	6	6	7	8	6	10	5	4
2.	11	12	12	14	16	11	11	12	12	13
	7	5	7	7	6	3	8	3	9	5
3.	13	16	11	11	12	12	13	13	14	14
	8	8	5	6	4	8	4	9	5	9

Copy and add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
4.	9	8	5	8	5	7	4	8	9	6
	4	9	6	3	4	5	6	1	8	4
	3	7	5	4	6	5	7	9	6	9
	6	7	8	9	7	6	5	5	8	5

Oral Problems

1. Add 3, 5, 8, and 4.

2. 7 and —— more make 15.

3. A yardstick is —— feet longer than a foot ruler.

4. There are 31 days in March. How many days are left when 7 days are gone?

5. There are 6 cows in one pasture and 5 in another. There are —— in both.

6. Jennie has 18 dolls. 5 of them are broken. How many whole ones has she?

7. There are 24 hours in a day. After 3 hours have passed —— hours remain.

8. Harry picked 16 water lilies. He gave away 12, and then had —— left.

9. A milkman has 20 quarts of milk. He delivers 8 quarts and has —— quarts left.

10. Tell what things you could buy with 15 cents; with 20 cents; with 18 cents.

11. Two girls together have 20 cents. One has 15 cents and the other has —— cents.

12. A carpenter needs 18 pounds of nails. He has 12 pounds. He must buy —— pounds more.

13. Clark earned 6¢ on Monday, 8¢ on Tuesday, and 6¢ on Wednesday. He earned —— cents in all.

14. In a game of ball the Browns beat the Reds by a score of 17 to 6. How many more scores would the Reds need to get to make the score even?

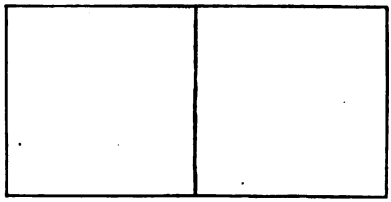


FIG. A

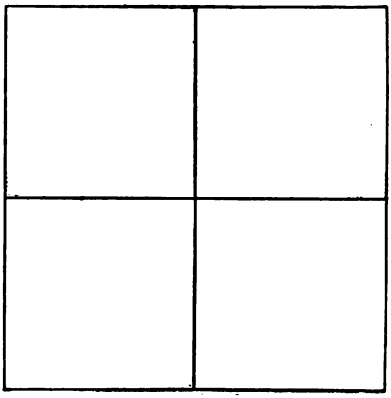


FIG. B

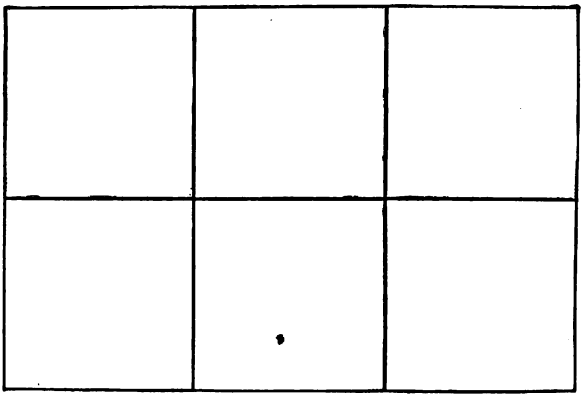


FIG. C

Oral Exercise

1. Figure *A* is —— inches long and —— inch wide and contains —— square inches.

2. Figure *B* is —— inches long and —— inches wide and contains —— square inches.

3. Figure *B* is —— times as large as Figure *A*.

4. Figure *A* is —— as large as Figure *B*.

5. 4 square inches is —— times 2 square inches.

6. 2 times —— square inches are 4 square inches.

7. Figure *C* is —— inches wide and contains —— square inches.

8. Figure *A* is equal to —— of Figure *C*.

9. 2 square inches are — of 6 sq. in.

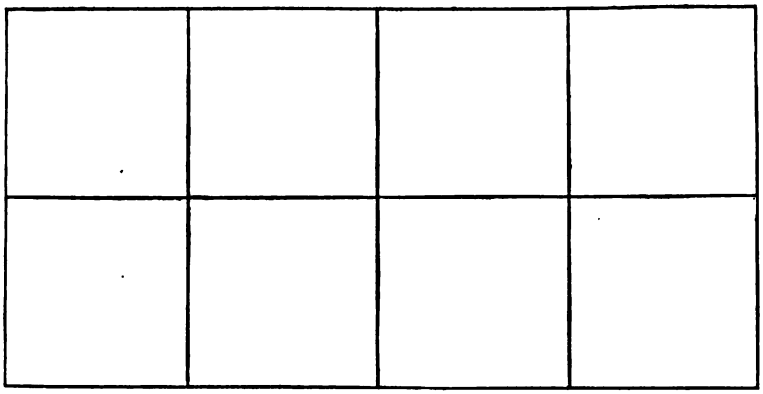


FIG. D

10. Figure *D* is —— inches long and —— inches wide, and contains —— square inches.

11. Figure *A* is equal to —— of Figure *D*.

12. 8 square inches are —— times 2 square inches.

13. 4 times —— square inches are 8 square inches.

14. Figure *B* is equal to —— of Figure *D*.

15. 8 square inches are —— times 4 square inches.

16. 2 times 4 square inches are —— square inches.

17. Figure *D* is —— times as large as figure *A*. $4 \times 2 =$ ——.

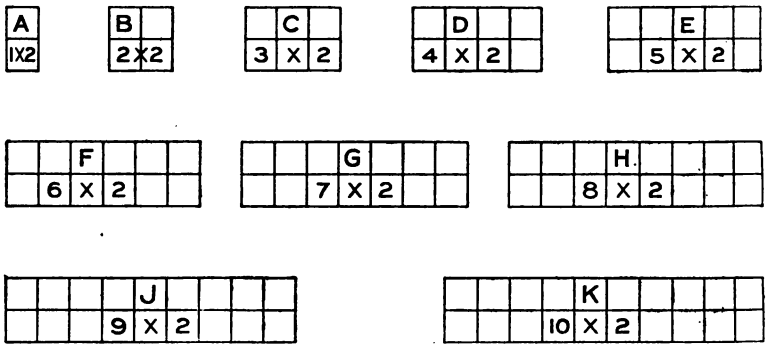
18. Count by 2's the squares in Figures *A*, *B*, *C*, *D*, thus, 2, 4, 6, etc.

19. If $A = 2$, then $B =$ ——, $C =$ ——, $D =$ ——.

20. If we call *A* worth 1 dollar, *B* is worth —— dollars, *C* is worth —— dollars, *D* is worth —— dollars.

Oral Exercise

1. Count these marks by 2's, to 36 and back:



2. How many squares are there in *A*? in *B*? *C*? *D*? *E*? *F*? *G*? *H*? *J*? *K*?

3. If *A* is 1, what is *B*? *C*? *D*? *E*? *F*? *G*? *H*? *J*? *K*?

4. If *A* is 2, what is *B*? *C*? *D*? *E*? *F*? *G*? *H*? *J*? *K*?

5. $2 \times 2 =$ —— $3 \times 2 =$ —— $4 \times 2 =$ —— $5 \times 2 =$ ——

6. $6 \times 2 =$ —— $7 \times 2 =$ —— $8 \times 2 =$ —— $9 \times 2 =$ ——

7. 2 is —— of 4 2 is —— of 6 2 is —— of 8

8. 2 is —— of 10 4 is —— of 8 4 is —— of 12

9. 3 is —— of 6 3 is —— of 9 3 is —— of 12

10. 4 = 2 times —— 6 = —— times 2 8 = —— times 2

11. $10 =$ —— $\times 2$ $12 =$ —— $\times 2$ $14 =$ —— $\times 2$

12. $16 =$ —— $\times 2$ $18 =$ —— $\times 2$ $20 =$ —— $\times 2$

Written and Sight Exercise

Copy, and write the answers:

	a	*b*	*c*	*d*
1.	$2 \times 2 =$ —	$5 \times 2 =$ —	$10 \times 2 =$ —	$4 \times 2 =$ —
2.	$6 \times 2 =$ —	$8 \times 2 =$ —	$1 \times 2 =$ —	$11 \times 2 =$ —
3.	$7 \times 2 =$ —	$9 \times 2 =$ —	$3 \times 2 =$ —	$12 \times 2 =$ —
4.	$16 =$ — 2's	$14 =$ — 2's	$20 =$ — 2's	$18 =$ — 2's
5.	$4 =$ — 2's	$10 =$ — 2's	$6 =$ — 2's	$12 =$ — 2's

Copy, and write the answers:

	a	*b*	*c*	*d*
6.	$8 \div 2 =$ —	$6 \div 2 =$ —	$10 \div 2 =$ —	$14 \div 2 =$ —
7.	$12 \div 2 =$ —	$18 \div 2 =$ —	$16 \div 2 =$ —	$20 \div 2 =$ —

8. Read, write, and learn these tables of 2's:

a	*b*	*c*	*d*
$1 \times 2 = 2$	$2 \times 1 = 2$	$2 \div 2 = 1$	$2 \div 1 = 2$
$2 \times 2 = 4$	$2 \times 2 = 4$	$4 \div 2 = 2$	$4 \div 2 = 2$
$3 \times 2 = 6$	$2 \times 3 = 6$	$6 \div 2 = 3$	$6 \div 3 = 2$
$4 \times 2 = 8$	$2 \times 4 = 8$	$8 \div 2 = 4$	$8 \div 4 = 2$
$5 \times 2 = 10$	$2 \times 5 = 10$	$10 \div 2 = 5$	$10 \div 5 = 2$
$6 \times 2 = 12$	$2 \times 6 = 12$	$12 \div 2 = 6$	$12 \div 6 = 2$
$7 \times 2 = 14$	$2 \times 7 = 14$	$14 \div 2 = 7$	$14 \div 7 = 2$
$8 \times 2 = 16$	$2 \times 8 = 16$	$16 \div 2 = 8$	$16 \div 8 = 2$
$9 \times 2 = 18$	$2 \times 9 = 18$	$18 \div 2 = 9$	$18 \div 9 = 2$
$10 \times 2 = 20$	$2 \times 10 = 20$	$20 \div 2 = 10$	$20 \div 10 = 2$

Give answers rapidly:

	a	*b*	*c*	*d*	*e*	*f*
9.	3×2	5×2	2×3	2×10	$10 \div 2$	$20 \div 2$
10.	6×2	2×5	2×6	$6 \div 2$	$8 \div 2$	$14 \div 2$

Oral Exercise

1. One paper of pins costs 2¢. Five papers cost ——¢.

2. At 2 cents each, 8 stamps cost —— cents. 10 stamps cost —— cents. 7 stamps cost —— cents.

3. Think of something you could buy for 2 cents. How many could you buy for 12 cents? for 10 cents? for 16 cents? for 20 cents? for 18 cents? for 14 cents?

4. Count these balls by 2's; by 3's; by 6's.

5. How many groups of 2 balls each could you make out of these? How many balls would equal $\frac{1}{2}$ of the lot?

6. What is $\frac{1}{2}$ of 4? of 6? of 10? of 12? of 14? of 16? of 18? of 20? of 8? of 2?

7. At 2 cents each how many boxes of matches can I buy for 12 cents? for 18 cents? for 20 cents? for 16 cents?

8. I have 16 marbles. I wish to give $\frac{1}{2}$ of them to Harry and $\frac{1}{2}$ to John. I shall give to each —— marbles.

9. To make 15, what number must be added to 10? to 9? to 8? to 7? to 6?

Read, and give answers rapidly:

	a	*b*	*c*	*d*
10.	15 = 9 + —	15 = 10 + —	15 = 8 + —	15 = 12 + —
11.	15 = 7 + —	15 = 6 + —	15 = 5 + —	15 = 13 + —
12	15 − 7 = ?	15 − 9 = ?	15 − ? = 8	15 − ? = 6

Oral Exercise

Add, observing the units', or ones', figure in each series:

	a	*b*	*c*	*d*	*e*	*f*
1.	9+6	8+7	10+5	11+4	7+8	6+9
	19+6	28+7	20+5	21+4	27+8	26+9
	29+6	48+7	30+5	31+4	37+8	46+9

2. What is the right-hand figure of the sum when we add 6 to a number ending in 9? 6? 8? 7? 5?

3. What is the right-hand figure of the sum when we add 7 to a number ending in 8? 6? 4? 5? 7?

4. What is the right-hand figure of the sum when we add 8 to a number ending in 7? 3? 5? 4? 6?

5. What is the right-hand figure of the sum when 9 is added to a number ending in 6? 5? 2? 3? 4?

Give the sums in the following:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
6.	5	6	8	7	8	9	5	6	6	9
	49	19	27	38	26	36	19	28	27	15

Give the remainders in the following:

7.	15	15	15	15	14	14	14	14	14	13
	8	6	9	7	7	6	9	8	5	8
8.	25	35	25	55	24	24	44	34	54	43
	8	6	9	7	7	6	9	8	5	8

Oral Exercise

1. How many 2's ☐☐ do you find in 4? ☐☐

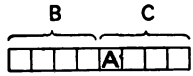
2. How many 3's ☐☐☐ do you find in 6? ☐☐☐

We may write the question, How many 3's in 6, thus: $6 \div 3 = ?$ or $3\overline{)6}$. We read both forms, 6 divided by 3 equals what? $6 \div 3$ means 6 is how many times 3?

Read, and give answers to the following:

	a	*b*	*c*	*d*
3.	$10 \div 2 = ?$	$12 \div 3 = ?$	$12 \div 2 = ?$	$16 \div 4 = ?$
4.	$9 \div 3 = ?$	$8 \div 4 = ?$	$12 \div 4 = ?$	$14 \div 2 = ?$

	a	*b*	*c*	*d*	*e*
5.	$2\overline{)12}$	$3\overline{)6}$	$4\overline{)12}$	$2\overline{)14}$	$2\overline{)18}$
6.	$3\overline{)12}$	$4\overline{)8}$	$2\overline{)20}$	$4\overline{)20}$	$2\overline{)16}$



7. A is 8. B is what part of A? C is what part of A? $\frac{1}{2}$ of $8 = ?$

8. By what do we divide to find $\frac{1}{2}$ of a number? By what do we divide to find $\frac{1}{3}$ of a number? $\frac{1}{4}$ of a number?

9. If 2 quarts of blueberries cost 10¢, how much will 1 quart cost? If 4 qt. cost 20¢, 2 qt. will cost —— cents.

10. If 4 pears cost 8 cents, how much will 1 pear cost?

11. When beans cost 6 cents a quart, a pint costs ——¢.

12. A half doz. oranges at 40¢ a doz. costs ——¢.

13. A grape fruit costs 16¢. $\frac{1}{4}$ costs ——¢. $\frac{2}{4}$ costs ——¢.

Oral Problems

1. If 4 fares on the street car cost 12 cents, how much does 1 fare cost?

2. Clara was at the seashore for 9 weeks. Gertrude was at the shore only $\frac{1}{3}$ as long. How many weeks was Gertrude at the seashore?

3. A man drove 30 miles in 3 hours. How far did he drive in 1 hour? in 2 hours?

4. If 4 yards of ribbon cost 12 cents, how much will 1 yard cost? How much will 2 yards cost if 4 yards cost 12 cents?

5. A table is 8 feet long. If it is $\frac{1}{2}$ as wide as it is long, how many feet wide is it?

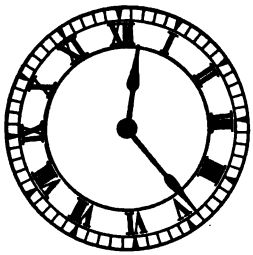
6. How many feet is it upon one side of a square which measures 12 feet around?

7. It takes 8 shoes to shoe an ox. How many shoes is this to a foot?

Written Exercise

Copy, and write the results:

	a	*b*	*c*	*d*	*e*
1.	$\frac{1}{2}$ of 6	$\frac{1}{2}$ of 60	$\frac{1}{2}$ of 80	$\frac{1}{3}$ of 30	$\frac{1}{3}$ of 60
	$2\overline{)6}$	$2\overline{)60}$	$2\overline{)80}$	$3\overline{)30}$	$3\overline{)60}$
2.	$\frac{1}{4}$ of 40	$\frac{1}{4}$ of 80	$\frac{1}{3}$ of 90	$\frac{1}{5}$ of 50	$\frac{1}{5}$ of 100
	$4\overline{)40}$	$4\overline{)80}$	$3\overline{)90}$	$5\overline{)50}$	$5\overline{)100}$



The pupils should refer to a clock dial in connection with this lesson.

1. Notice the letters on the clock face. They are called Roman numerals because they were used by the Romans as we use figures, thus:

I = 1	IIII or IV = 4		VII = 7	X = 10
II = 2	V	= 5	VIII = 8	XI = 11
III = 3	VI	= 6	IX = 9	XII = 12

2. What do we call the pointers on the clock? How many are there?

3. Point to the long hand. Point to the short hand.

4. When both hands are at XII, it is —— o'clock.

5. If the long hand is at XII, and the short hand at I, it is —— o'clock. Because the short hand tells us the hour, we call it the hour hand.

6. Keep the long hand at XII, and make the hour hand point to each number shown on the clock face till it comes round to XII, and tell what hour it shows at each number.

7. How long does it take the hour hand to move from each number to the next on the real clock?

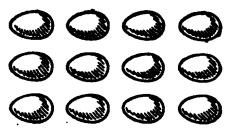
8. How long does it take the hour hand to move from XII to I? from XII to II? from II to III? from IIII to VI? from VIII to XI? from IX to XII?

Twelve things make a dozen.

Oral Problems

1. Name some things that we buy by the dozen.

2. How many eggs make a dozen? How many make a half dozen?



3. There are a dozen months in a year. Name them in order.

4. If apples sell for 1 cent each, a dozen will cost —— cents. A half dozen will cost —— cents.

5. There are —— oranges in $\frac{1}{3}$ of a dozen. There are —— in $\frac{1}{4}$ of a dozen.

6. There are how many inches in a foot? $\frac{1}{2}$ dozen inches is —— of a foot.

7. At 12 cents a dozen $\frac{1}{2}$ of a dozen plums cost —— cents; $\frac{1}{3}$ of a dozen cost —— cents; $\frac{1}{4}$ of a dozen cost —— cents; $\frac{2}{3}$ of a dozen cost —— cents.

8. George had a dozen marbles. He lost 4, which is —— of a dozen. He had —— marbles left.

9. Nine peaches cost 9 cents. One dozen will cost —— cents. $1\frac{1}{2}$ dozen will cost —— cents.

10. A man buys a dozen bunches of bananas for $9 and sells them for $1 a bunch. He makes how much?

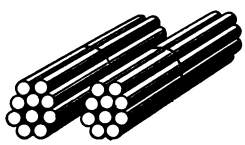
Doz. is the short way of writing dozen.

11. Add 1 doz. + 2 doz. + 3 doz.

Oral and Written Exercise

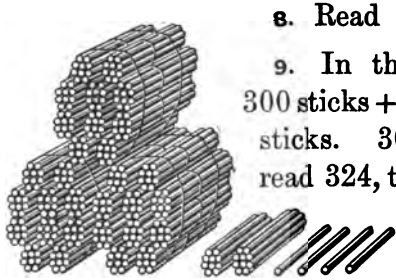
Read, and supply numbers for the blank spaces:

1. 14 = ——ten and——ones; 76 = ——tens and —— ones.
2. 35 = ——tens and——ones; 99 = ——tens and ——ones.
3. Count to 10 by ones; from 10 to 100 by 10's.



4. How many sticks are there in the two bundles? Write twenty in figures.
5. If 2 more sticks were added, how many would there be?

6. Each of these bundles contains 100 sticks. If we write one hundred thus, 100, how should we write three hundred? six hundred?
7. Write in figures two hundred, four hundred, seven hundred.
8. Read 400, 500, 800, 900, 300.



9. In this picture we are shown 300 sticks + 20 sticks + 4 sticks or 324 sticks. 300 + 20 + 4 = 324. We read 324, three hundred twenty-four.

Read, and tell the hundreds, tens, and ones each number is made up of:

	a	*b*	*c*	*d*	*e*
10.	427	780	748	216	279
11.	743	507	325	902	972

Written Exercise

Ten bundles of 100 each would make one bundle of 10 hundred. 10 hundred is called **one thousand.** One thousand is written thus, 1000; three thousand thus, 3000, and so on.

1. In which place from the right hand do we write tens? hundreds? thousands? ones?

Write the following numbers:

2. Three hundred eleven. Two hundred sixteen.
3. Fifty-two. Seven hundred ninety-eight.
4. Four hundred seven. Six hundred seventy.
5. Nine hundred eighty-seven. Eighty-eight.
6. One hundred nineteen. Four hundred four.
7. Eight hundred sixty-five.
8. Two hundred nine. Nine hundred ninety-nine.
9. Three thousand four hundred seventy-five.

Write in columns:

10. Four hundred sixteen, five hundred seventy-eight, eighty-seven, one hundred twelve, eight hundred.
11. Five thousand four hundred eighteen, seven thousand one hundred twenty-six. Eight thousand.

Read the following numbers:

	a	*b*	*c*	*d*	*e*
12.	346	376	602	116	1600
13.	296	778	160	675	1606
14.	882	493	567	978	2650
15.	281	587	432	209	2068

Oral Exercise

Add at sight:

	a	*b*	*c*	*d*	*e*	*f*
1.	3	30	300	33	330	323
	5	50	500	55	550	454

Subtract at sight:

	a	*b*	*c*	*d*	*e*	*f*
2.	8	80	800	88	880	433
	2	20	200	22	220	221

3. Count by 10's from 10 to 100; from 1 to 91; from 2 to 92.

Written Exercise

Add:

	a	*b*	*c*	*d*	*e*
1.	597	654	248	209	200
	302	321	631	580	120
2.	346	356	545	344	225
	653	422	454	432	644

Subtract:

	a	*b*	*c*	*d*	*e*
3.	320	325	418	814	209
	110	214	306	603	109
4.	228	437	346	634	364
	117	125	224	532	152

5. Subtract \$524 from \$657.

6. Add \$458 to \$321. 7. \$309 + \$504 + \$206 = ?

Oral Problems

1. Cut three strips of paper each 1 inch wide and 1 foot long. Fold and cut one into halves, one into thirds, one into fourths.

2. Show by your paper that there are —— inches in a foot; that in $\frac{1}{2}$ of a foot there are —— inches; in $\frac{1}{3}$ ft. —— inches; in $\frac{1}{4}$ ft. —— inches.

3. Show how many inches there are in $1\frac{1}{2}$ feet; in $1\frac{1}{3}$ feet; in $1\frac{1}{4}$ feet; in $1\frac{2}{3}$ feet; in $1\frac{3}{4}$ feet.

4. Show that 6 inches are —— of a foot; that 3 inches are —— of a foot; that 4 inches are —— of a foot.

5. In 1 yard there are —— feet. In $\frac{1}{3}$ of a yard there is —— foot. In $\frac{2}{3}$ of a yard there are —— feet. In $\frac{1}{2}$ of a yard there is 1 foot and —— of a foot.

6. 1 foot is —— of a yard. 2 feet are —— of a yard.

7. In $1\frac{1}{3}$ yards there are —— feet. In 2 yards there are —— feet; in 4 yards; in 5 yards.

8. $1\frac{1}{2}$ feet are —— of a yard or —— inches.

9. A box cover is 1 foot long and $\frac{1}{2}$ as wide. It is —— inches wide.

10. A ditch is 1 yard wide and $\frac{1}{2}$ as deep. It is —— feet deep. It is —— inches deep.

11. A desk is $1\frac{1}{3}$ yards long. It is —— feet long.

12. A square picture frame measures $1\frac{1}{2}$ feet upon the side. How many yards is it around the frame?

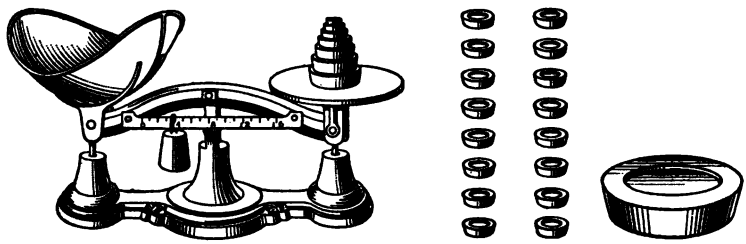
Oral Exercise

Read, and supply the missing numbers:

1. 15 lemons are 1 dozen and —— lemons.
2. 14 cents are 1 dime and —— cents.
3. 17 cents are 1 dime, 1 nickel, and —— cents.
4. 18 days are 2 weeks and —— days.
5. 13 inches are 1 foot and —— inch.
6. 19 inches are 1 foot and —— inches.
7. 16 months are 1 year and —— months.
8. 11 pints are —— quarts and —— pint.
9. 3 bananas are what part of 1 dozen?
10. 10 feet are —— yards and —— foot.
11. $1\frac{1}{2}$ feet are —— inches.
12. $1\frac{1}{2}$ doz. are —— things.
13. $1\frac{1}{2}$ qt. are —— pints.
14. $1\frac{1}{4}$ feet are —— inches.
15. $1\frac{1}{4}$ doz. are —— things.
16. $1\frac{1}{4}$ yr. are —— months.
17. $1\frac{2}{3}$ yards are —— feet.
18. $\frac{3}{4}$ ft. = —— in.
19. $\frac{2}{3}$ doz. = —— things.
20. $2\frac{1}{2}$ qt. = —— pt.
21. $1\frac{2}{3}$ ft. = —— in.
22. $1\frac{3}{4}$ doz. = —— ones.
23. $1\frac{1}{4}$ lb. = —— oz.
24. $1\frac{1}{2}$ yd. = —— ft.

From 2 dimes, how much change should you receive:

25. If you buy 5 one-cent and 2 two-cent stamps?
26. If you buy 4 two-cent and 5 one-cent stamps?
27. If you buy 6 two-cent and 2 three-cent stamps?
28. If you buy 5 two-cent and 2 five-cent stamps?



16 ounces, oz., equal 1 pound, lb.

Oral Exercise

1. One pound equals —— ounces. $\frac{1}{2}$ of a pound equals —— ounces. $\frac{1}{4}$ of a pound equals —— ounces.

2. 8 ounces equal —— of a pound. 4 oz. = —— of 1 lb.

3. To balance a 1 pound weight it takes —— 8 ounce weights. It takes —— 4 ounce weights.

4. It takes —— 4 ounce weights to equal $\frac{3}{4}$ of a pound.

5. Four 4 ounce weights weigh —— pound.

6. Name 3 things that are sold by the lb.; by the oz.

7. A package of pepper weighs $\frac{1}{4}$ of a pound. It weighs —— ounces. $1\frac{1}{4}$ pounds = —— ounces.

8. A man bought 1 pound of cinnamon in 4 ounce packages. He got —— packages.

9. At 16¢ a pound, $\frac{1}{2}$ pound of raisins costs —— cents.

10. If 1 lb. of tea costs 60¢, 8 oz. will cost —— cents.

Written Exercise

Copy, and supply the missing numbers:

1. 8 ounces = —— of a pound.
2. 1 pound and —— ounces = 20 ounces.
3. 6 yards and 2 feet are —— feet.
4. 1 dozen and 6 lemons are —— lemons.
5. 1 year and 5 months are —— months.
6. 2 weeks and 3 days are —— days.
7. 3 nickels and 3 cents are —— cents.
8. 1 dime and 7 cents are —— cents.

Add:

9.	10.	11.
55 pounds	4 ounces	16 ounces
11 pounds	14 ounces	11 ounces
22 pounds	10 ounces	42 ounces

Subtract:

12.	13.	14.
96 pounds	24 ounces	84 pounds
16 pounds	12 ounces	50 pounds

15. $36 + \text{——} = 39$
16. $75 + \text{——} = 85$
17. $22 + 7 = \text{——}$
18. $43 + 8 = \text{——}$
19. $30 + \text{——} = 39$
20. $24 - 5 = \text{——}$
21. $38 - 9 = \text{——}$
22. $\text{——} + 4 = 37$
23. $31 + 10 = \text{——}$
24. $15 + 6 = \text{——}$
25. $23 + \text{——} = 31$
26. $40 + 11 = \text{——}$
27. $47 - 8 = \text{——}$
28. $\text{——} + 8 = 56$

Oral Exercise

Read, and give answers rapidly:

	a	*b*	*c*	*d*
1.	$16=8+—$	$16=7+—$	$17=9+—$	$18=9+—$
2.	$16=9+—$	$17=7+—$	$17=8+—$	$15=9+—$

Add, observing the right-hand figure in each series:

	a	*b*	*c*	*d*	*e*	*f*
3.	$7+9$	$8+8$	$9+7$	$9+8$	$8+9$	$9+9$
	$17+9$	$18+8$	$19+7$	$29+8$	$18+9$	$19+9$
	$57+9$	$48+8$	$69+7$	$39+8$	$48+9$	$99+9$

4. What is the right-hand figure of the sum when 9 is added to a number ending in 9? 4? 5? 6? 7? 8? when 8 is added to these numbers? when 7 is added? when 6 is added?

Written and Sight Exercise

Copy the following, and give the sums:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
1.	6	7	9	8	8	8	6	7	7	9
	19	19	27	38	36	19	19	28	27	18

Copy, and give the remainders:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
2.	16	16	16	17	17	18	15	15	14	14
	-9	-7	-8	-8	-9	-9	-7	-9	-5	-8
3.	26	36	26	57	27	38	45	75	84	74
	-9	-7	-8	-8	-9	-9	-7	-9	-5	-8

Written Exercise

Copy, and write the sums:

	a	*b*	*c*	*d*
1.	123	122	423	423
	865	223	144	552
2.	$154	$415	$500	$230
	224	411	300	340
	610	340	100	110
3.	$101	$110	$400	$15
	202	220	50	61
	303	330	12	142

4. It took Clarence 28 minutes to learn his geography lesson, 7 minutes for his spelling lesson, and 6 minutes for his reading lesson. He spent how many minutes in all?

5. Lucy practiced her music 25 minutes before school, 10 minutes at noon, and 8 minutes after school. She practiced how many minutes in all?

6. Alice had 3 dimes, 1 nickel, and enough more cents to make 45 cents. She had how many more cents?

Add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
7.	8	8	9	7	7	7	8	9	6	7
	3	4	0	5	4	0	4	6	4	8
	6	9	9	8	4	8	4	6	9	8
	9	2	9	3	9	9	8	5	5	3

Pint

Quart

Gallon

2 pints = 1 quart
4 quarts = 1 gallon
8 pints = 1 gallon

Oral Exercise

1. There are —— quarts of milk in 1 gallon.
There are —— quarts of milk in $\frac{1}{2}$ gallon.
There is —— quart of milk in $\frac{1}{4}$ gallon.
There are —— quarts of milk in $\frac{3}{4}$ gallon.

2. One pint = —— of 1 quart.
One pint = —— of 2 quarts.

3. There are —— pints in $1\frac{1}{2}$ quarts.
There are —— pints in 2 quarts.

4. If 1 pint of water weighs 1 pound, $\frac{1}{2}$ of a pint weighs —— of a pound.

5. In $1\frac{1}{2}$ gallons there are —— quarts. In $\frac{1}{4}$ gallon there are —— pints. In $\frac{1}{2}$ gallon there are —— pints.

6. At 20 ¢ a pint, 1 quart of cream costs —— cents. $\frac{1}{2}$ pint costs —— cents.

7. At 8 cents a quart, 1 gallon of milk costs —— cents. 1 pint costs —— cents.

8. Oil at 12 ¢ a gallon is worth —— cents a quart.

We write gal. for gallon or gallons.

9. What do we write to stand for quart or quarts? for pint or pints? (See p. 38.)

10. Read: 2 gal. 3 qt. 1 pt.

8 quarts = 1 peck
4 pecks = 1 bushel
32 quarts = 1 bushel

Quart

Peck

Bushel

MATERIAL: Sawdust, sand, or grain; a quart measure, a peck measure, a bushel measure.

Fill the quart measure. Pour its contents into the peck measure. Continue till the peck measure is full. How many quarts are there in a peck?

Oral Exercise

1. Mention some things that are measured by the quart, peck, and bushel. We write **pk.** for peck or pecks and **bu.** for bushel or bushels.

2. Nuts at 10 ¢ a quart cost —— cents a peck.

3. Charcoal at 20 ¢ a bushel costs —— cents for $\frac{1}{2}$ bushel.

4. At 10 ¢ a quart, cranberries cost —— cents for 5 quarts.

5. 1 bushel and 3 pecks are —— pecks.

6. 5 pecks are —— bushel and —— peck.

7. A man has 2 bushels of potatoes. He sells 2 pecks and then has —— pecks left.

8. 2 bu. and 1 peck are —— pecks. $\frac{1}{2}$ bu. = —— pk.

9. 12 qt. are 1 peck and —— qt. $1\frac{1}{2}$ pecks = —— qt.

10. A bushel of apples sells for 40 cents. 1 peck sells for —— cents.

11. 10 pecks are —— bushels and —— pecks.

Written Exercise

Copy and subtract:

	a	*b*	*c*	*d*
1.	775	677	895	486
	243	356	244	344
2.	$769	$639	$758	$488
	537	525	315	323
3.	432	432	421	437
	320	22	221	326
4.	$288	$597	$252	$899
	100	410	11	228

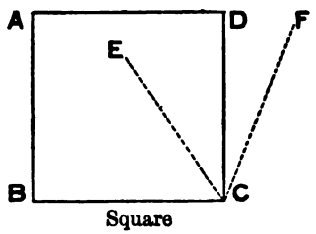
5. A newsboy bought 37 Heralds, 9 Journals, and 8 Records. He bought how many papers in all?

6. Another newsboy sold 15 Journals, 8 Advertisers, and 9 Transcripts. How many did he sell?

7. A newsboy paid 134 cents for a lot of papers and sold them for 179 cents. How much did he gain?

Copy and add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
8.	8	8	6	5	9	5	7	6	9	6
	3	2	2	0	4	2	2	1	0	5
	7	9	5	8	5	9	8	7	8	6
	5	6	9	9	8	8	8	9	7	8



Square

Oral Exercise

(Review pp. 8 and 9.)

Right angle

Obtuse angle

Acute angle

1. $ABCD$ is a ——. It has —— equal sides, and —— equal corners. The corners are called **angles.**

The corners of a square or of an oblong are right angles.

> **Angles are formed by the meeting of lines.**

2. Notice the dotted line EC. It forms an angle with the line BC. Is the angle formed larger or smaller than the right angle BCD?

> **Angles that are smaller than right angles are called *acute angles.***

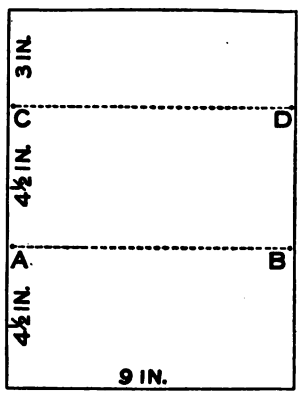
3. Notice the dotted line FC. It makes an angle with the line BC. Is the angle formed larger or smaller than the right angle BCD?

> **Angles that are larger than right angles are called *obtuse angles.***

4. Point out all the acute angles on this page.
5. Point out all the obtuse angles on the page.
6. Point out all the right angles on the page.

Making an Envelope—Seat Work

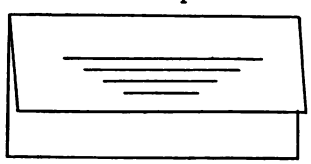
MATERIALS FOR EACH PUPIL: 1 sheet of 9 in. × 12 in. Manila drawing paper or oak tag, a foot rule, a pencil, and 2 paper fasteners.



DICTATION. Place the paper on the desk with a short side toward you. Measure up on each side $4\frac{1}{2}$ inches from the lower corners, and place dots at A and B. Draw a line, AB, across the paper connecting these two dots. From this line measure up $4\frac{1}{2}$ inches on each side, and make dots at C and D. Connect these two dots by a straight line, CD. Fold the paper on lines AB and CD. Fasten the ends by paper fasteners at C and D, thus making an envelope as shown in the figure below.

NOTE. Suitable decorations may be applied in pencil or color and the finished work may be taken home by the child.

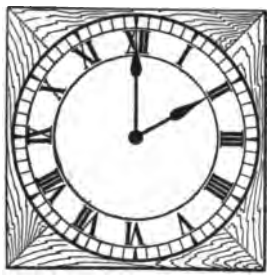
Envelope



Pupils should have frequent practice in making problems to test one another. For example, the above exercise suggests problems they might make concerning the sheet of Manila paper, as: What is the distance around it? the length of one side of the largest square that could be cut from it? the distance around the flap, or part that would remain? The flap is what part of the whole sheet? and so on.

Oral Exercise

(Review p. 84.)



1. Show how far the hour hand moves in an hour. Show how far the minute hand moves in an hour.

2. What time is it by the clock face on this page?

3. Show where the hands of the real clock are at 10 minutes after 2 o'clock.

4. Show where the hands are at 30 minutes after 2, or at half past 2 o'clock.

5. Show on the clock face that it is 10 minutes after 1 o'clock.

6. Show that it is 20 minutes after 2 o'clock.

7. Show where the hands are at the time for beginning school in the morning; in the afternoon; at the beginning of recess in the morning; at the close of recess in the afternoon; at the close of school in the morning.

8. If you start for school at half past 8 o'clock in the morning, show where the hands are when you start.

9. If it takes you 15 minutes to walk to school, show where the hands are when you reach the schoolhouse.

10. If you leave home at 15 minutes after 8 to do an errand which takes you 10 minutes, what time will it be when the errand is done?

11. On your clock face notice the little lines between XII and I. Count the spaces marked off by these lines. In a real clock it takes the long hand one minute to move over one of these spaces. For this reason it is called the minute hand.

12. How many minutes does it take the minute hand to move from XII to I? from I to II? from II to III? from any numeral to the next?

13. How many minutes, then, does it take for the minute hand to go around the face of the clock?

14. It takes the hour hand one hour to move from one numeral to the next. It takes the minute hand the same length of time to move around the face of the clock.

60 minutes = 1 hour.

15. It takes Della 20 minutes to dust the sitting room. If she begins at 5 minutes after 8 o'clock, show where the hands will be when she finishes.

ROMAN NUMERALS

1. What is the Roman numeral for 10? for 1? for 5?

2. If X represents 10, what should XX represent? XXX?

3. Tell what is represented by VI; XI; XXII; XXXV.

4. Show how the same two letters are made to represent 11 and 9.

5. Since IX represents 9, what should XXIX represent? XXXIX? XIX?

Oral Exercise

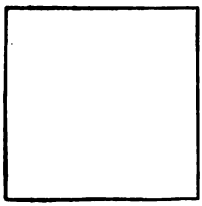


FIG. A

1. With your foot ruler measure the length and width of Figure *A*. It is —— in. long and —— in. wide.

What name do we give to a square surface of the size of figure *A*?

The surface of a figure is called its *area*.

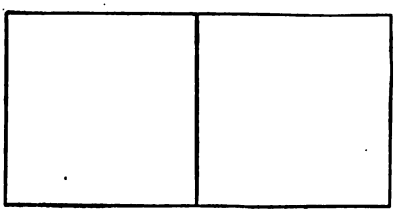


FIG. B

2. If a square 1 in. long and 1 in. wide has an area of 1 square inch, what is the area of Figure *B*?

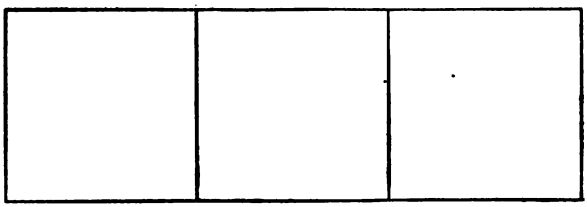


FIG. C

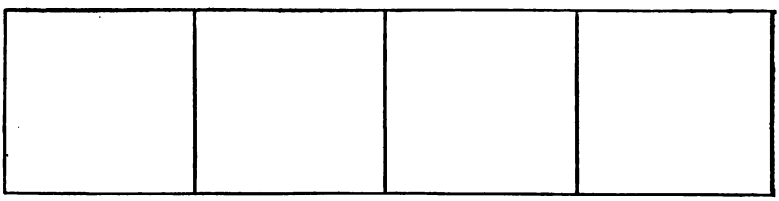


FIG. D

3. Tell which of the figures on the opposite page is 2 in. ıg by 2 in. wide. What is its area?

4. Tell which of the figures is 3 in. long and 2 in. wide. What is its area?

5. Tell which of the figures is 4 in. long and 1 in. wide. What is its area?

6. What is the area of an oblong that is 3 in. long by 2 in. wide?

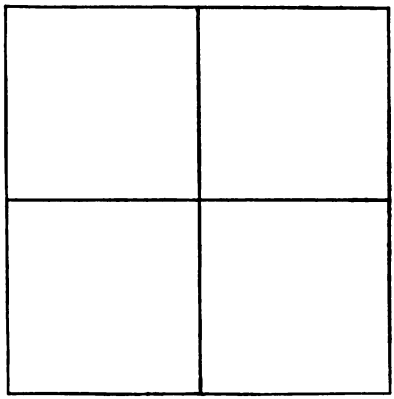


FIG. E

7. Tell at sight the number of square inches in Figure *C*; in Figure *D*; in Figure *E*; in Figure *F*.

8. Draw on the blackboard a square 1 foot long and 1 foot wide.

A square 1 foot long and 1 foot wide is called a *square foot*.

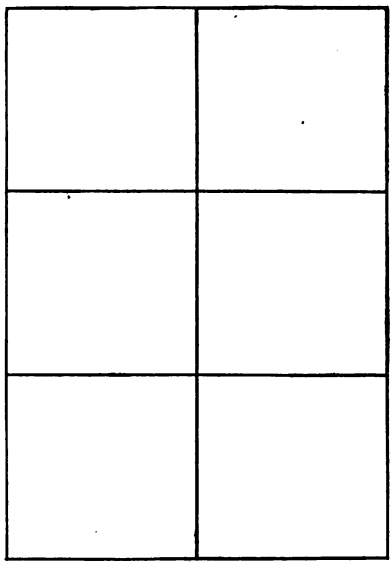


FIG. F

9. Draw on the blackboard an oblong 2 feet long and 1 foot wide. How many square feet are in its area?

Oral Exercise

1. Cut a square of paper 1 in. wide and 1 in. long. Its area is —— square inch.

2. Cut a strip of paper 1 in. wide and 6 in. long. How many square inches can you mark off on its surface? There are —— times 1 square inch, or —— square inches.

3. Cut a piece of paper 2 in. wide and 6 in. long. If in the strip 1 in. wide and 6 in. long there are 6 sq. in., in this strip which you have just cut there must be 2 times 6 sq. in. = —— sq. in.

4. An oblong is 4 feet wide and 10 feet long. We say its area is equal to 4×10 sq. ft. = —— sq. ft.

5. A square-cornered rug is 3 feet wide and 6 feet long. How many square feet does it contain?

6. A square-cornered window seat is 5 feet long and 2 feet wide. A cloth to cover it must contain —— times 5 square feet, or —— square feet.

7. Draw a picture of an oblong 2 in. by 4 in., and tell how many square inches there are in its surface.

8. A piece of ribbon is 2 inches wide and 10 inches long. It contains —— square inches.

9. A pine board is 3 feet wide and 10 feet long. It contains —— square feet.

10. A hall is 6 feet wide and 10 feet long. What is its area? What is the distance around it?

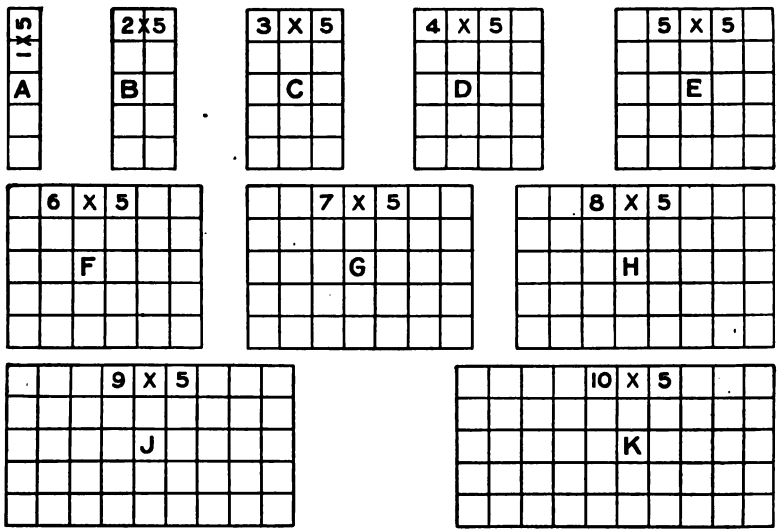
Oral and Written Review Table

	A	B	C	D	E
1.	13 − 2	10 − 6	10 × 10	12 − 6	6 ÷ 2
2.	44 − 3	5 + 13	6 × 10	17 − 9	14 − 8
3.	23 − 4	9 − 4	8 + 9	13 − 9	12 ÷ 2
4.	18 − 5	7 + 6	8 × 2	5 − 5	14 − 9
5.	28 − 4	7 + 14	4 + 9	14 − 7	18 − 9
6.	30 ÷ 10	15 − 9	4 × 3	16 − 7	11 + 7
7.	9 + 5	11 − 8	5 + 7	9 − 4	7 + 8
8.	12 − 8	13 − 5	8 ÷ 2	20 − 6	8 + 7
9.	11 − 4	13 − 8	8 + 6	14 − 5	9 + 6
10.	14 + 5	18 − 3	$\frac{1}{4}$ of 4	20 + 8	6 + 9
11.	16 − 5	15 + 6	9 + 7	16 − 8	7 + 9
12.	19 − 3	22 − 5	$\frac{1}{2}$ of 20	13 + 4	5 + 8
13.	17 + 3	13 − 6	$\frac{1}{4}$ of 40	9 + 8	15 ÷ 5
14.	7 + 13	15 − 12	$\frac{1}{5}$ of 50	14 + 6	16 + 9
15.	15 + 4	11 − 9	10 ÷ 10	23 − 7	18 + 7
16.	9 + 10	14 − 9	11 − 7	15 − 8	17 + 8
17.	7 + 12	12 − 3	20 − 9	12 − 7	11 + 9
18.	3 + 9	15 + 7	20 + 7	20 − 5	19 + 6

Write out the combinations and answers for column *A*; for *B*; for *C*; for *D*; for *E*.

NOTE. The teacher should make use of the drill table for rapid oral review. The table should be enlarged for a wall chart.

To test pupils individually in written work, have each call himself 1, 2, 3, etc., or *A*, *B*, *C*, etc., and then do the work his letter or number indicates.



Oral Exercise

1. To how many A's is C equal? is D equal? E? F?

2. If A is 1, what is B? C? D? E? F? G? H? J? K?

3. If A is 5, what is B? C? D? E? F? G? H? J? K?

4. Count by 5's from 5 to 50; from 50 to 100.

5. Count backward by 5's from 50 to 5.

6. If B is 10, what is D? F? H? K?

Give products rapidly at sight:

	a	*b*	*c*	*d*	*e*
7.	1×5	3×5	5×5	7×5	9×5
8.	2×5	4×5	6×5	8×5	10×5

Oral Exercise

1. A is equal to one —— of B; of C; of D; of E.

2. 5 is —— of 10. 5 is —— of 15. 5 is —— of 20. 5 is —— of 25.

3. 30 is —— 5's. 35 is —— 5's. 40 is —— 5's. 45 is —— 5's. 50 is —— 5's.

Give the answers at sight:

4. $\frac{1}{2}$ of 10 = ——
$\frac{1}{2}$ of 20 = ——

5. $\frac{1}{3}$ of 15
$\frac{1}{3}$ of 30

6. $\frac{1}{4}$ of 20
$\frac{1}{4}$ of 40

7. $\frac{1}{5}$ of 25
$\frac{1}{5}$ of 50

8. $\frac{1}{2}$ of 30 = ——
$\frac{1}{2}$ of 40 = ——

9. $\frac{1}{5}$ of 35 = ——
$\frac{1}{5}$ of 15 = ——

10. $\frac{1}{5}$ of 20 = ——
$\frac{1}{5}$ of 30 = ——

11. $\frac{1}{5}$ of 40 = ——
$\frac{1}{5}$ of 45 = ——

12. 5 is $\frac{1}{2}$ of ——
5 is $\frac{1}{3}$ of ——

13. 5 is $\frac{1}{4}$ of ——
5 is $\frac{1}{5}$ of ——

14. 10 is 2 times ——
15 is 3 times ——

15. 20 is 4 times ——
25 is 5 times ——

16. 30 is 6 times ——
35 is 7 times ——

17. 40 is 8 times ——
45 is 9 times ——

18. 20 is 5 times ——
15 is 5 times ——

19. 45 is 5 times ——
40 is 5 times ——

20. 35 is 5 times ——
30 is 5 times ——

21. 50 is 5 times ——
45 is 5 times ——

22. In an orchard there are 10 rows of trees, with 5 trees in each row. There are —— trees in all.

23. One school week is 5 days. In 5 school weeks there are —— school days.

24. If one fan costs 5 cents, 8 fans cost —— cents.

Oral Exercise

1. At 5 dollars apiece 6 shawls will cost —— dollars.

2. How many days are there in $\frac{1}{4}$ of a school month of 20 days?

3. There are 7 stories in a building and 5 windows in each story. There are —— windows in all.

4. Harry, Joe, and Raymond had 30 marbles. Harry had $\frac{1}{3}$ of 30, or —— marbles. Joe and Raymond had $\frac{2}{3}$ of 30, or —— marbles.

5. From a box containing 45 bushels of grain, $\frac{1}{5}$ was taken out. —— bushels were taken out.

6. Helen earns 10 cents an hour. In $2\frac{1}{2}$ hours she earns —— cents.

7. How many square inches are there in a card 7 inches long and 5 inches wide? in a card 5 inches square?

8. Read, write, and learn these tables of 5's:

a	*b*	*c*	*d*
$1 \times 5 = 5$	$5 \times 1 = 5$	$5 =$ one 5	$5 = 5$ ones
$2 \times 5 = 10$	$5 \times 2 = 10$	$10 =$ —— 5's	$10 = 5$ twos
$3 \times 5 = 15$	$5 \times 3 = 15$	$15 =$ —— 5's	$15 = 5$ ——
$4 \times 5 = 20$	$5 \times 4 = 20$	$20 =$ —— 5's	$20 = 5$ ——
$5 \times 5 = 25$	$5 \times 5 = 25$	$25 =$ —— 5's	$25 = 5$ ——
$6 \times 5 = 30$	$5 \times 6 = 30$	$30 =$ —— 5's	$30 = 5$ ——
$7 \times 5 = 35$	$5 \times 7 = 35$	$35 =$ —— 5's	$35 = 5$ ——
$8 \times 5 = 40$	$5 \times 8 = 40$	$40 =$ —— 5's	$40 = 5$ ——
$9 \times 5 = 45$	$5 \times 9 = 45$	$45 =$ —— 5's	$45 = 5$ ——
$10 \times 5 = 50$	$5 \times 10 = 50$	$50 =$ —— 5's	$50 = 5$ ——

Oral Problems

1. At \$10 an acre, how many acres of land can be bought for \$20? for \$30? for \$40?

2. At 5¢ a quart, —— quarts will cost 20¢.

3. A boy paid 25¢ for a knife and sold it for 8¢ more. He sold it for ——¢.

4. A merchant sold some goods for \$30. If he gained \$5, how much did the goods cost him?

5. I had \$15. I spent \$9, and had how much left?

6. A boy rides on his bicycle 5 miles, which is $\frac{1}{4}$ of the distance which he must go. How far must he go?

7. From a piece of cloth 45 yards long, 10 yards are sold. How many yards remain?

8. How many hours is it from 5 o'clock to half past 8?

9. How much do 8 boxes of butter weigh, each containing 5 pounds?

10. I have 10 cents in one pocket and 7 cents in another. How many cents are there in both?

11. Fred had 16 toy soldiers. He lost 7. How many had he left?

12. How many \$5 bills will make \$15? \$20? \$30? \$35? How many \$10 bills will make \$30? \$60?

13. A pupil is in school 5 hours a day. In a week of 5 school days he spends —— hours in school.

14. A box is 5 inches long and 5 inches wide. How many square inches are there in the bottom of the box?

Oral Exercise

1. Add by 5's from 3 to 33. Thus, 3, 8, 13, 18, etc.

2. Subtract by 5's from 33 to 0. Thus, 33, 28, 23, etc.

3. Subtract from 58 by 10's; by 4's.

4. I can buy 2 oranges for 5¢. How many can I buy for 10¢? for 20¢? for 25¢?

5. There are —— 5's in 45.

6. If apples cost at the rate of 3 for 5 cents, how much will 6 apples cost?

7. A grocer sold 3 melons for 25 cents. How much should he receive for 6 melons?

Written Exercise

1. Two bundles weigh one 152 pounds and the other 204 pounds. How much do both weigh?

2. One number is 85, the other is 60. What is their sum? What is their difference?

3. The post office is 202 steps from Mary's house. How many steps must she take to go to the office and back?

Copy, and write the sums:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
4.	9	6	7	9	9	9	6	5	9	9
	4	5	9	8	8	7	9	5	6	4
	7	7	5	8	8	7	8	6	4	3
	4	5	9	7	18	28	17	28	29	49

Oral Problems

1. At 2¢ each, $\frac{1}{2}$ doz. apples cost —— cents.

2. At 2¢ each, —— bananas can be bought for 16¢.

3. At 10¢ each, —— hoops can be bought for 50¢.

4. At 5¢ each, 25¢ will pay for —— car fares.

5. At 2¢ each, 9 tops will cost —— cents.

6. A girl has 8 cents, and spends 2 cents for paper. She spends —— of 8 cents.

7. If 6 books cost $10, 12 books will cost —— dollars.

8. A horse goes 8 miles in 1 hour. In 5 hours he can go —— miles.

9. There are 16 pints in —— qt. 18 pints = —— qt.

10. In 8 quarts there are —— pints.

11. In —— qt. there are 14 pt. 5 qt. 1 pt. = —— pt.

12. At $10 each, for $50 I can buy —— chairs. For $70 I can buy —— chairs.

13. For 45 cents I can buy —— pencils at 5 cents each.

14. In 30¢ there are —— dimes. There are —— nickels.

15. I bought a 35¢ book. I paid for it with —— nickels.

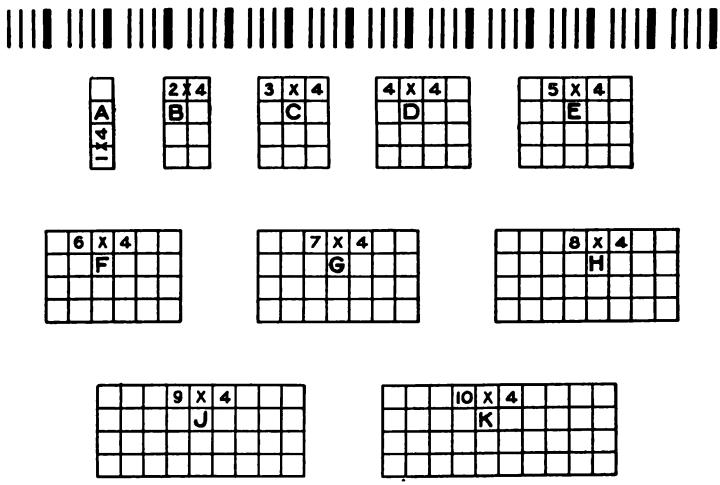
16. In 100 cents there are —— dimes; in 90 cents —— dimes; in 80 cents —— dimes.

17. If 4 pounds of sugar cost 20¢, 1 pound costs —— cents. I can buy —— pounds for 25 cents.

18. 9 quarts and 1 pint = —— pints.

Oral Exercise

1. Count these marks by 4's to 48 and back:



2. How many squares are there in *A*? in *B*? in *C*? *D*? *E*? *F*? *G*? *H*? *J*? *K*?

3. If *A* is 1, what is *B*? *C*? *D*? etc.

4. If *A* is 4, what is *B*? *C*? *D*? etc.

5. $2 \times 4 =$ — $3 \times 4 =$ — $4 \times 4 =$ — $5 \times 4 =$ —

6. $6 \times 4 =$ — $7 \times 4 =$ — $8 \times 4 =$ — $9 \times 4 =$ —

7. $8 =$ —— $\times 4$ $12 =$ —— $\times 4$ $16 =$ —— $\times 4$

8. $20 =$ —— $\times 4$ $24 =$ —— $\times 4$ $28 =$ —— $\times 4$

9. $32 =$ —— $\times 4$ $36 =$ —— $\times 4$ $40 =$ —— $\times 4$

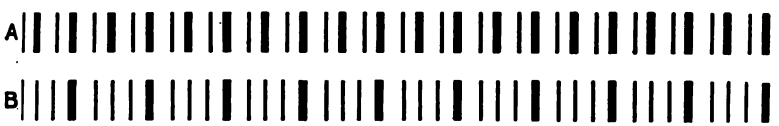
10. $20 \div 4 =$ —— $16 \div 4 =$ —— $12 \div 4 =$ ——

11. $24 \div 4 =$ —— $28 \div 4 =$ —— $32 \div 4 =$ ——

12. $36 \div 4 =$ —— $40 \div 4 =$ —— $8 \div 4 =$ ——

Oral and Written Exercise

1. Count line *A* by 2's. Count line *B* by 4's.



NOTE. In the above arrangement of marks the teacher should call special attention to the similarity and identity of parts as they occur in corresponding series. For example, we have

In the 2's	2,	4,	6,	8,	10,	12,	14,	16,	18,	20, etc.
In the 4's		4,		8,		12,		16,		20, etc.

2. Read, write, and learn these tables of 4's:

a	*b*	*c*	*d*
$1 \times 4 = 4$	$4 \times 1 = 4$	$4 \div 4 = 1$	$4 \div 1 = 4$
$2 \times 4 = 8$	$4 \times 2 = 8$	$8 \div 4 = 2$	$8 \div 2 = 4$
$3 \times 4 = 12$	$4 \times 3 = 12$	$12 \div 4 = 3$	$12 \div 3 = 4$
$4 \times 4 = 16$	$4 \times 4 = 16$	$16 \div 4 = 4$	$16 \div 4 = 4$
$5 \times 4 = 20$	$4 \times 5 = 20$	$20 \div 4 = 5$	$20 \div 5 = 4$
$6 \times 4 = 24$	$4 \times 6 = 24$	$24 \div 4 = 6$	$24 \div 6 = 4$
$7 \times 4 = 28$	$4 \times 7 = 28$	$28 \div 4 = 7$	$28 \div 7 = 4$
$8 \times 4 = 32$	$4 \times 8 = 32$	$32 \div 4 = 8$	$32 \div 8 = 4$
$9 \times 4 = 36$	$4 \times 9 = 36$	$36 \div 4 = 9$	$36 \div 9 = 4$
$10 \times 4 = 40$	$4 \times 10 = 40$	$40 \div 4 = 10$	$40 \div 10 = 4$

3. Multiply 4, 3, 5, 10, 8, 2, 7, 1, 6, 9 each by 4, by 5, by 2, by 10.

Divide each of the following by 4:

4.	12	20	40	8	16	24	4	28	32	36
5.	14	21	43	11	18	27	7	31	34	39

Oral Problems

1. If a man earns $12 in 3 days, in 1 day he earns —— dollars. In 4 days he earns —— dollars.

2. At $5 a ton, 4 tons of coal cost 4 times $5, which is —— dollars. $23 will buy —— tons with $—— left over.

3. When 4 melons cost 24 cents, 1 costs —— cents.

4. From a string 1 ft. long how many 4 in. pieces can be cut? What will be left if two 5 in. pieces are cut?

5. There are —— ounces in a pound. 1 pound will make —— 4 ounce packages.

6. If $\frac{1}{4}$ of all the children in a class is 6, the whole number is —— children.

7. If $\frac{1}{4}$ of a pound of cheese costs 7 cents, 1 pound costs —— cents.

8. There are 24 hours in one day. In $\frac{1}{4}$ of a day there are —— hours.

9. How many sides have 5 squares?

10. How many sides have 4 squares?

11. If it is 16 in. around a square, how long is each side?

12. How many shoes are needed to shoe 9 horses?

13. How many horses would need 28 shoes?

14. How many chairs would be placed in each row if 36 chairs were placed in 4 equal rows?

15. What is the cost of 4 lb. of meat at 9¢ a pound?

16. In 1 dollar there are how many quarters of a dollar? How many quarters are there in 2 dollars? in 3 dollars?

Oral or Written Exercise

1. $\frac{1}{2}$ of 4 = —— $\frac{1}{2}$ of 40 = —— $\frac{1}{2}$ of 60 = ——
2. $\frac{1}{4}$ of 8 = —— $\frac{1}{4}$ of 80 = —— $\frac{1}{4}$ of 20 = ——
3. $\frac{1}{4}$ of 16 = —— $\frac{1}{4}$ of 24 = —— $\frac{1}{4}$ of 28 = ——
4. $\frac{1}{4}$ of a gallon = —— quart.
5. $\frac{1}{4}$ of a peck = —— quarts.
6. 24 quarts = —— gallons.
7. In one pound there are —— ounces.
8. 4 ounces = —— of a pound.
9. 76 cents − 40 cents = —— cents.

Oral Exercise

1. How much will 1 gallon of milk cost at 7¢ a quart?
2. Six squares have how many right angles?
3. If oil is 16¢ a gallon, what is the cost of 1 quart?
4. What part of 1 foot are 4 inches?
5. 4 yards and 2 feet are —— feet.
6. Count by 4's from 20 to 40, thus: 20, 24, 28, etc.
7. Count backward by 4's from 20, thus: 20, 16, etc.
8. Add by 4's from 1 as far as 21, thus: 1, 5, 9, etc.
9. Add by 4's from 2 as far as 22; from 3 as far as 23.
10. 4 is contained in 26 —— times with —— over.

Written and Sight Exercise

1. One quart equals —— of a gallon.
2. Two quarts equal —— of a gallon.
3. Two gallons equal —— quarts.
4. Sixteen quarts equal —— gallons.
5. A can holds 20 quarts. It holds —— gallons.
6. A two-gallon jug holds —— quarts.
7. A ten-quart pail holds —— gallons and —— quarts.
8. Forty quarts will fill —— gallon cans.

Review of Combinations

Copy, and write the products:

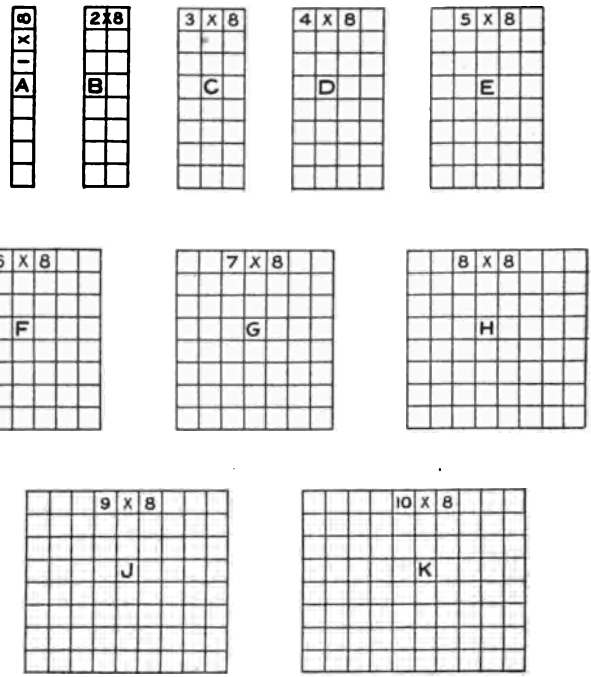
1. $\left.\begin{matrix}2\times 1\\1\times 2\end{matrix}\right\}=$
2. $\left.\begin{matrix}2\times 2\\4\times 1\\1\times 4\end{matrix}\right\}=$
3. $\left.\begin{matrix}5\times 1\\1\times 5\end{matrix}\right\}=$
4. $\left.\begin{matrix}3\times 2\\2\times 3\end{matrix}\right\}=$
5. $\left.\begin{matrix}4\times 2\\2\times 4\end{matrix}\right\}=$
6. $3\times 3 =$
7. $\left.\begin{matrix}5\times 2\\2\times 5\\10\times 1\\1\times 10\end{matrix}\right\}=$
8. $\left.\begin{matrix}6\times 2\\2\times 6\\3\times 4\\4\times 3\end{matrix}\right\}=$
9. $\left.\begin{matrix}7\times 2\\2\times 7\end{matrix}\right\}=$
10. $\left.\begin{matrix}3\times 5\\5\times 3\end{matrix}\right\}=$
11. $\left.\begin{matrix}8\times 2\\2\times 8\\4\times 4\end{matrix}\right\}=$
12. $\left.\begin{matrix}9\times 2\\2\times 9\end{matrix}\right\}=$
13. $\left.\begin{matrix}10\times 2\\2\times 10\\4\times 5\\5\times 4\end{matrix}\right\}=$
14. $\left.\begin{matrix}6\times 4\\4\times 6\end{matrix}\right\}=$
15. $5\times 5 =$
16. $\left.\begin{matrix}7\times 4\\4\times 7\end{matrix}\right\}=$
17. $\left.\begin{matrix}3\times 10\\10\times 3\\6\times 5\\5\times 6\end{matrix}\right\}=$
18. $\left.\begin{matrix}8\times 4\\4\times 8\end{matrix}\right\}=$
19. $\left.\begin{matrix}7\times 5\\5\times 7\end{matrix}\right\}=$
20. $\left.\begin{matrix}9\times 4\\4\times 9\end{matrix}\right\}=$
21. $\left.\begin{matrix}4\times 10\\10\times 4\\8\times 5\\5\times 8\end{matrix}\right\}=$
22. $\left.\begin{matrix}9\times 5\\5\times 9\end{matrix}\right\}=$
23. $\left.\begin{matrix}5\times 10\\10\times 5\end{matrix}\right\}=$
24. $\left.\begin{matrix}6\times 10\\10\times 6\end{matrix}\right\}=$
25. $\left.\begin{matrix}7\times 10\\10\times 7\end{matrix}\right\}=$
26. $\left.\begin{matrix}8\times 10\\10\times 8\end{matrix}\right\}=$
27. $\left.\begin{matrix}9\times 10\\10\times 9\end{matrix}\right\}=$
28. $10\times 10 =$

Oral Exercise

1. There are —— quarts in $\frac{1}{2}$ of a peck.
2. There are —— qt. in 2 pecks. 3 pecks = —— qt.
3. Find, by measuring, how many quarts make a bushel.
4. There are 4 —— in a bushel.
5. There are 4 times —— quarts in a bushel.
6. There are —— quarts in a bushel.

Tell how many there are:

7. Quarts in 6 gallons? in 6 gallons 3 quarts?
8. Pecks in 7 bushels? in 7 bushels 2 pecks?
9. Feet in 5 yards? in 5 yards 2 feet?
10. Quarters of a dollar in \$2? in \$2$\frac{3}{4}$?
11. Dimes in \$10? in \$10 and 40 cents?
12. Cents in 9 dimes? in 9 dimes 7 cents?
13. Cents in 9 nickels? in 9 nickels 4 cents?
14. Ones in 7 tens? in 7 tens 9 ones?
15. Quarts in 4 pecks? in 4 pecks 3 quarts?
16. Weeks in 35 days? weeks and days in 38 days?
17. Quarts in 18 pints? quarts and pints in 19 pints?
18. Yards in 30 feet? yards and feet in 32 feet?
19. Bushels in 36 pecks? bushels and pecks in 38 pk.?
20. Gallons in 8 quarts? in 16 quarts?
21. Dollars in 18 half dollars? dollars and cents in 19 half dollars?
22. How many dimes in 10 nickels? dimes, nickels, and cents in 10 nickels and 7 cents?

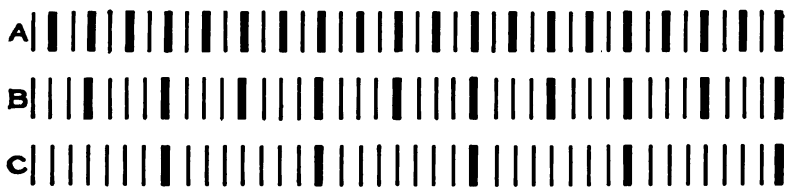


Oral and Written Exercise

1. How many squares are there in *A*? in *B*? C? etc.
2. If *A* is 1, what is *B*? *C*? *D*? etc. If *A* is 8?
3. $2 \times 8 =$ —— $3 \times 8 =$ —— $4 \times 8 =$ ——
4. $5 \times 8 =$ —— $6 \times 8 =$ —— $7 \times 8 =$ ——
5. $8 \times 8 =$ —— $9 \times 8 =$ —— $10 \times 8 =$ ——
6. $16 =$ — times 8 $24 =$ — times 8 $32 =$ — times 8
7. $40 =$ — times 8 $48 =$ — times 8 $56 =$ — times 8
8. $24 \div 8 =$ — $32 \div 8 =$ — $40 \div 8 =$ — $48 \div 8 =$ —
9. $56 \div 8 =$ — $64 \div 8 =$ — $72 \div 8 =$ — $80 \div 8 =$ —

Oral Exercise

1. Count the marks by 2's, by 4's, by 8's:



2. Count by 2's, 4's, and 8's from 2 to 40, thus:

2's, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40.
4's, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40.
8's, 8, 16, 24, 32, 40.

NOTE. The teacher should call attention to the similarity of parts in the series. (See Note, p. 113.)

3. Read, write, and learn these tables of 8's:

a	*b*	*c*	*d*
$1 \times 8 = 8$	$8 \times 1 = 8$	$8 \div 8 = 1$	$8 \div 1 = 8$
$2 \times 8 = 16$	$8 \times 2 = 16$	$16 \div 8 = 2$	$16 \div 2 = 8$
$3 \times 8 = 24$	$8 \times 3 = 24$	$24 \div 8 = 3$	$24 \div 3 = 8$
$4 \times 8 = 32$	$8 \times 4 = 32$	$32 \div 8 = 4$	$32 \div 4 = 8$
$5 \times 8 = 40$	$8 \times 5 = 40$	$40 \div 8 = 5$	$40 \div 5 = 8$
$6 \times 8 = 48$	$8 \times 6 = 48$	$48 \div 8 = 6$	$48 \div 6 = 8$
$7 \times 8 = 56$	$8 \times 7 = 56$	$56 \div 8 = 7$	$56 \div 7 = 8$
$8 \times 8 = 64$	$8 \times 8 = 64$	$64 \div 8 = 8$	$64 \div 8 = 8$
$9 \times 8 = 72$	$8 \times 9 = 72$	$72 \div 8 = 9$	$72 \div 9 = 8$
$10 \times 8 = 80$	$8 \times 10 = 80$	$80 \div 8 = 10$	$80 \div 10 = 8$

4. Multiply each of the following numbers by 8:

2, 4, 5, 10, 3, 6, 1, 7, 8, 9.

5. Multiply again, and add to the product 4, 5, 6, or 7.

Oral Problems

1. A peck of apples is sold at 10 cents a quart. How much is it sold for?

2. In a basket there are 3 pecks of cherries. There are —— quarts of cherries.

3. A rope is 32 feet long. $\frac{1}{4}$ of it is cut off. —— feet are cut off. If $\frac{3}{4}$ are cut off —— feet remain.

4. Ruth is 8 years old. Her uncle is 5 times as old and 2 years more. He is —— years old.

5. In a schoolroom there are 6 rows of seats and 8 seats in each row. There are —— seats in all.

6. A person should sleep 8 hours every night. In a week he should sleep —— hours.

7. An orchard contains 64 trees. There are 8 rows of —— trees in each row.

8. If a fruit dealer pays 8 cents a quart for pecans, he pays —— cents for 9 quarts.

9. A man who works 10 hours a day works —— hours in 8 days.

Written Exercise

Copy, and write the quotients:

	a	*b*	*c*	*d*
1.	$16 \div 8$	$24 \div 8$	$32 \div 8$	$40 \div 8$
2.	$16 \div 2$	$24 \div 3$	$32 \div 4$	$40 \div 5$
3.	$48 \div 8$	$56 \div 8$	$64 \div 8$	$72 \div 9$
4.	$48 \div 6$	$56 \div 7$	$80 \div 10$	$72 \div 8$

Oral Exercise

1. At 8¢ a pound, 2 pounds of meat cost — ¢.

2. At 8 cents a pound, $1\frac{1}{2}$ pounds of nuts cost —— cents.

3. The checkerboard has 64 squares. It has 8 rows with —— squares in each row.

4. How many panes of glass are there in 6 windows if there are 8 panes in each window?

5. How many $5 bills are equal to 4 $10 bills?

6. At 8 cents a pound what is the cost of 10 pounds of lard? of 9 pounds?

7. 7 hens have 8 chickens each. How many have all the hens?

8. If 8 oranges cost 40 cents, how much does 1 cost?

9. A peck of grain costs 24¢; 1 quart costs —— cents.

10. 8 yards less 2 feet are how many feet?

11. At 48¢ a peck, 1 quart of beans costs —— cents.

12. What is the cost of 8 quarts of cherries at 9 cents a quart?

13. How many pounds of sugar, at 5¢ a pound, can be bought for 40¢?

14. $56 \div 8 =$ ——. 7 is $\frac{1}{8}$ of ——.

Divide each of the following numbers by 8:

15.	16	40	24	8	80	32	64	48	56	72
16.	19	45	29	15	86	36	68	50	60	75

Oral or Written Exercise

1. 1 pound = —— ounces.
2. $\frac{1}{2}$ pound = —— ounces.
3. $5 \times 8 =$ ——; $4 \times 8 =$ ——.
4. $\frac{1}{4}$ of 8 = ——; 8 is $\frac{1}{4}$ of ——.
5. In 1 peck there are —— quarts. In 24 quarts there are —— pecks. 25 qt. = —— pk. and —— qt.
6. 8 is $\frac{1}{3}$ of ——; 8 is $\frac{1}{2}$ of ——.
7. 1 day = —— hours. $\frac{1}{4}$ of 24 hours = —— hours.
8. 1 peck and 2 quarts = —— quarts.
9. $8 \times 7 = 7 \times$ ——. $9 \times 8 = 8 \times$ ——.

Oral Problems

1. At 24 cents a dozen, how much will $\frac{1}{4}$ of a dozen eggs cost?
2. A horse can go 16 miles in 2 hours. How far can it go in 1 hour? How far can it go in 4 hours?
3. 3 pecks + 2 quarts = —— quarts.
4. 24 quarts = —— pecks. 24 pecks = —— bushels.
5. 8 feet = —— yards and —— feet.
6. What is the cost of 8 barrels of flour at \$7 a barrel?
7. How many 8 quart cans are needed to hold 72 quarts of milk?
8. If 8 yards of ribbon cost 24 cents, how much does 1 yard cost?
9. Add by 8's from 1 to 81; from 2 to 82.

Oral Exercise

1. How many boxes of currants, at 8 cents a box, can be bought for 72 cents?

2. $4 \times 8 = 8 \times$ ——. $4 \times 3 = 3 \times$ ——.

3. $2 \times 4 = 4 \times$ ——. $4 \times 5 = 5 \times$ ——.

4. $7 \times 4 =$ ——. $9 \times 4 =$ ——.

5. $4 \times 7 = 7 \times$ ——. $4 \times 9 = 9 \times$ ——.

6. 4 is contained in 30 —— times with —— over.

7. If 32 trees are in 4 rows, how many are there in each row? 32 trees will make —— rows of 10 with —— trees over.

8. How many 10 pound jars will be needed for 40 pounds of butter? how many 8 pound jars?

9. $3 \times 8 = 8 \times$ ——. $5 \times 8 = 8 \times$ ——.

10. $2 \times 3 = 3 \times$ ——. $2 \times 5 = 5 \times$ ——.

11. A boy had 12 papers and sold 4. How many had he left? What part of the 12 did he sell?

12. $6 \times 4 = 3 \times$ ——. $6 \times 4 = 4 \times$ ——.

13. $36 \div 4 =$ ——. $\frac{1}{4}$ of $36 =$ ——.

14. A boy had 40 plums and gave away $\frac{1}{4}$ of them. How many did he give away? How many had he left?

15. How many 2's are in 10? 12? 16? 20? 40? 60?

16. How many 4's are in 20? in 24? 32? 36?

17. Hiram worked for Mr. Smith from Monday morning to Saturday night. At $2 a day, how much did he receive in all?

Written Exercise

Illustrative Example for the Teacher.* Add 16 and 18.

a		*b*
WORK		Write only:
16		16
18		18
14	(8 + 6 ones)	34
2	(1 + 1 ten)	
34,	Total sum.	

EXPLANATION. In *a* we add the ones and the tens separately and then add their sums. In practice we write only the total sum, as in *b*.

Here we look at 8 and 6 and think 14; 14 ones = 1 ten and 4 ones. We write 4 in the ones' place and add the 1 ten to the tens in the tens' column, making 3 tens. 3 tens with 4 ones = 34. *Ans.* 34.

Add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	16	53	18	34	26	32	25	28
	38	18	35	27	14	29	26	14
2.	57	39	46	65	68	76	53	26
	15	48	39	28	27	16	29	67
3.	14	49	16	28	39	37	26	19
	49	33	59	34	15	23	34	12
	11	22	6	16	12	15	10	31
4.	46	15	16	66	28	38	28	29
	34	37	46	22	54	25	34	32
	9	17	14	26	19	37	42	24

* NOTE. To indicate a method of presentation.

Written Problems

1. A farmer sold 15 dozen eggs at one store, and 17 dozen at another. How many dozen did he sell at both stores?

2. Ned sold 24 eggs in March, 36 in April, and 18 in May. How many did he sell in the three months?

3. A man kept 19 horses in one barn and 24 in another barn. How many horses did he keep in both barns?

4. A boy lights 12 lamps on one street, 13 on another street, and 9 on another. How many does he light in all?

5. A boy sold 37 papers on Monday, 29 papers on Tuesday, and 16 papers on Wednesday. How many did he sell in the three days?

6. He sold 25 papers on Thursday, 19 on Friday, and 27 on Saturday. How many did he sell in these three days?

7. Helen has 49 dishes in one of her tea sets and 28 in another. How many pieces are there in both sets?

8. Helen's mother has three sets of plates, one of 13 plates, one of 14 plates and the other of 18 plates. How many plates are there in all?

9. After spending 45 cents of her money, Kate had 39 cents left. How much had she at first?

10. The school garden is 24 yards long by 23 yards wide. How many yards is it around the garden?

Written Exercise

Illustrative Example for the Teacher.* Add 356 to 297:

WORK

a.
$$\begin{array}{r} 297 \\ 356 \\ \hline 13 \\ 14 \\ 5 \\ \hline 653 \end{array}$$

(6 + 7 ones).
(5 + 9 tens).
(3 + 2 hundreds).
Total sum.

EXPLANATION. We add as we add numbers of two figures.

In practice, writing only the total sum as in *b*, we look at 6 and 7 and think 13; 13 = 1 ten and 3 ones. We write 3 in the ones' place and add the 1 ten to the tens, making with 5 tens and 9 tens, 15 tens or 1 hundred and 5 tens. We write 5 tens in the tens' place and add the 1 hundred to the hundreds, making with 3 hundreds and 2 hundreds, 6 hundreds. We write 6 in the hundreds' place. 6 hundreds, 5 tens, and 3 ones = 653. *Ans.* 653.

Write only this:

b.
$$\begin{array}{r} 297 \\ 356 \\ \hline 653 \end{array}$$

Add upward, and prove by adding downward:

	a	*b*	*c*	*d*	*e*
1.	367	465	187	255	564
	147	239	256	368	167
2.	784	144	498	458	676
	145	265	245	357	197
3.	144	20	458	676	798
	265	498	88	76	176
	29	245	398	132	58

* NOTE. To indicate a method of presentation.

Written Exercise

Add:

	a	*b*	*c*	*d*	*e*
1.	115	104	109	112	122
	314	363	280	97	325
	396	585	174	865	808
2.	135	308	267	97	27
	342	8	102	267	232
	227	291	391	45	49
	132	327	86	563	367

Write in figures and add the following:

3. Two hundred seventeen, one hundred thirty-two, two hundred fifty-two, three hundred eleven, nine hundred five.

4. Five hundred seven, one hundred ninety-six, two hundred sixty-four.

Add:

5. 236 + 475 + 160
6. 240 + 134 + 48
7. \$175 + \$267 + \$89
8. \$205 + \$467 + \$150
9. 367 ft. + 90 ft. + 87 ft.
10. 700 ft. + 86 ft. + 90 ft.
11. 56 lb. + 109 lb. + 87 lb.
12. 496 yd. + 187 yd. + 238 yd.
13. 378 yd. + 268 yd. + 348 yd.

14. 233 qt.
27 qt.
132 qt.
203 qt.

15. 121 in.
250 in.
127 in.
306 in.

Written Problems

1. Henry's father bought a horse for $250, a carriage for $158, and a harness for $37. How much did they all cost?

2. A man bought a house lot for $425 and paid $198 for grading it. How much did it cost for the lot and grading together?

3. An expressman delivered 387 pounds of leather at one factory and 296 pounds at another factory. How many pounds did he deliver at both factories?

4. In the children's room at the Public Library there are 567 books on one side of the room and 379 books on another side. How many books are on the two sides?

5. In Mary's school there are 439 boys and 387 girls. How many children are there in the school?

6. Willie's Reader has 189 pages, his Arithmetic 158 pages, and his Speller 86 pages. How many pages have all?

7. The iceman sold to Mr. Brown 58 pounds of ice the first quarter of the year, 194 pounds the second quarter, 247 pounds the third quarter, and 136 pounds the last quarter. How many pounds did he sell in all?

8. Find the sum of the letters and figures in problem 7 above, if there are 38 in the first line, 46 in the second, 43 in the third, and 34 in the fourth.

9. Count the letters and figures in each line of problem 3 above and find their sum.

Oral Exercise

1. Mildred made some ice cream. She used 2 quarts of milk, 3 pints of cream, and 1 pint of preserved pineapple. How many pints were there? how many quarts?

2. If a quart of milk costs 6 cents, what is the cost of 2 quarts and 1 pint?

3. A 10 quart milk pail is $\frac{1}{5}$ full. How many quarts are there in it? how many pints? how many half pints?

4. Milk costs 8 cents a quart. How much do 3 pints cost?

5. 6 quarts of milk will fill —— pint jars.

6. 8 pints of milk will fill —— quart jars.

7. 8 quarts of spring water will fill —— gallon bottles.

8. 9 pints of milk will fill —— quart jars and —— pint jar.

9. 16 quarts of molasses = —— gallons.

10. 10 quarts of sirup = —— gallons and —— quarts.

11. 9 gallons, 2 quarts of oil = —— quarts.

12. There are 30 days in June, 31 in July, and 31 in August. At 1¢ a day for a daily paper, how much will the paper bill amount to for these 3 summer months?

Written Exercise

Add the following both in column and in line:

1.	2.	3.
$46+88=$	$25+69=$	$68+95=$
$85+76=__$	$47+84=__$	$89+49=__$
$+\quad=$	$+\quad=$	$+\quad=$

Written Exercise

1. Add forty-six, one hundred, thirty-six, four hundred seven, one hundred forty-two.

2. Add four hundred sixty-five, two hundred forty-four, seven hundred nine.

3. Add ninety-seven, five hundred forty, three hundred eight.

4. Find the sum of one hundred sixty-five, two hundred four, eighty-seven, three hundred.

5. Find the sum of three hundred four, one hundred eighty-three, sixty, one hundred thirty-nine, five hundred eighty-seven.

Add upward, and prove by adding downward:

	a	*b*	*c*	*d*	*e*	*f*
1.	230	424	815	469	162	243
	37	123	926	208	286	109
	64	228	796	166	69	356
2.	432	147	257	28	360	484
	185	56	90	300	18	94
	451	94	378	84	139	80
	276	127	149	176	75	319
3.	268	157	268	152	454	105
	385	397	359	394	152	250
	124	221	158	186	116	197
	226	174	388	247	264	279

Written Exercise

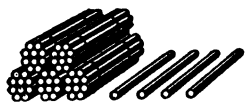
Add upward, and verify by adding downward:

	a	*b*	*c*	*d*	*e*	*f*
1.	36	37	23	67	32	74
	65	43	46	55	48	56
	71	68	75	42	63	99
	23	26	37	79	54	87
2.	79	69	160	243	300	249
	150	253	126	98	250	188
	235	82	190	164	165	175
	95	318	87	87	298	320
3.	$347	$818	$125	$168	$250	$425
	89	127	250	92	400	215
	162	56	585	101	200	127
	243	321	24	356	140	189

4. 648 bu. + 276 bu.
5. $464 + $398.
6. 189 qt. + 293 qt.
7. 176¢ + 63¢ + 48¢.
8. 139 yd. + 137 yd. + 647 yd.
9. 469 bu. + 321 bu. + 314 bu.
10. 875 ft. + 179 ft. + 216 ft.
11. 239 lb. + 198 lb. + 248 lb.
12. 927 gal. + 43 gal. + 16 gal.
13. $355 + $123 + $998.
14. 728 cows + 143 cows.
15. 392 books + 219 books.
16. $375 + $125 + $475.
17. $527 + $293 + $115.
18. 49 + 94 =
    27 + 85 =
    49 + 38 =
    73 + 94 = __
    \+ =

Written Exercise

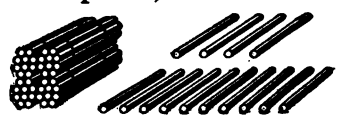
Illustrative Example. From 54 splints take 29 splints.



50 + 4 = 54

TEACHER'S EXPLANATION. (See Note, p. 126.) Lay out 54 splints in 5 bundles of ten and 4 loose splints.

We are to take away 29 splints. We cannot take 9 splints out of 4 splints, so we untie one of the bundles of ten, leaving 4 bundles tied. The untied ten with the 4 loose splints makes 14 splints.



40 + 14 = 54

9 splints from 14 splints leaves 5 splints. 2 bundles of ten from 4 bundles of ten leaves 2 bundles. 2 bundles of ten splints with 5 loose splints = 25 splints. Therefore, 29 splints from 54 splints = 25 splints.

Ans. 25 splints.

In practice we write only these figures: We think this: 9 ones from 4 ones we cannot take. Take one of the 5 tens, leaving 4 tens. The 1 ten with the 4 ones makes 14. 9 from 14 leaves 5. Write 5 in the ones' place below the line. 2 tens from 4 tens leaves 2 tens. Write 2 in the tens' place below the line.

54	Minuend
29	Subtrahend
25	Remainder

Ans. 25.

To verify or prove the work, add 25 to 29. The sum should equal 54.

In subtracting, the part to be taken away is called the **subtrahend.** The part left is called the **remainder.**

The whole, of which a part is to be taken away, is called the **minuend.**

Written Exercise

Subtract, and prove by adding remainder to subtrahend:

	a	*b*	*c*	*d*	*e*	*f*	*g*
1.	52	43	63	82	42	32	83
	36	27	24	35	27	24	56
2.	40	80	41	91	50	61	61
	18	15	23	35	33	19	26
3.	90	81	71	80	40	71	60
	24	27	44	39	27	22	46
4.	52	90	64	62	91	84	50
	28	12	18	23	48	37	21
5.	82	74	73	34	83	94	75
	39	26	45	15	68	29	29
6.	66	85	93	86	65	96	85
	37	46	49	58	27	39	28
7.	43	65	87	98	415	759	827
	12	22	44	35	122	462	574
8.	30	40	80	21	43	75	81
	14	16	35	13	24	66	22

Written Exercise

Ill. Ex. for the Teacher. (See Note, p. 126.)—(1) Subtract 395 from 682. (2) Subtract 385 from 602.

WORK

(1) 682
395
287

EXPLANATION. We cannot take 5 ones from 2 ones. Take 1 ten from 8 tens, leaving 7 tens. The 1 ten with the 2 ones makes 12 ones. 5 ones from 12 ones leaves 7 ones. We cannot take 9 tens from the 7 tens which were left. Take 1 hundred from 6 hundreds, leaving 5 hundreds. The 1 hundred with the 7 tens makes 17 tens. 9 tens from 17 tens leaves 8 tens. 3 hundreds from the 5 hundreds left leaves 2 hundreds. $682 - 395 = 287$, *Ans.*

Or we may say, 5 ones and 7 ones make 12 ones, and write 7 in the ones' place; 9 tens and 8 tens make 17 tens, and write 8 in the tens' place; 3 hundreds and 2 hundreds make 5 hundreds, and write 2 in the hundreds' place. Remainder 287. *Teach but one method.*

(2) 5 9 12
6 0 2
3 8 5
2 1 7

In Ill. Ex. (2), since there are no tens in 602, we may think of 100 of the 600 as changed to 10 tens, and of 1 of these 10 tens as united with the 2 ones. The 602 is thus thought of as changed to 500, 90, and 12. *Ans.* 217.

	a	*b*	*c*	*d*	*e*	*f*	*g*
1.	250	583	951	361	454	\$945	\$892
	− 123	354	293	193	275	376	443
2.	120	146	230	408	638	905 in.	303 ft.
	− 40	23	119	225	179	799 in.	25 ft.

Written Exercise

Subtract the following:

	a	*b*	*c*
1.	545 – 312	139 – 61	132 – 52
2.	150 – 90	130 – 90	786 – 758
3.	275 – 129	484 – 357	521 – 408
4.	928 – 464	378 – 253	643 – 267
5.	989 – 408	367 – 265	903 – 734
6.	\$848 – \$605	\$706 – \$687	\$878 – \$404

7. 865 yd. – 357 yd.
8. 764 miles – 657 miles.
9. 560 pounds – 57 pounds.
10. 787 yd. – 469 yd.
11. 996 gal. – 238 gal.
12. 837 years – 619 years.
13. 744 bu. – 527 bu.
14. 695 qt. – 488 qt.

	a	*b*	*c*	*d*	*e*	*f*	*g*
15.	133	143	756	767	486	985	333
	79	68	647	409	457	176	108
16.	175	144	975	496	990	880	567
	76	98	858	377	569	789	489
17.	897	787	588	978	967	867	502
	579	388	89	969	538	689	206
18.	948	739	844	986	873	904	452
	654	698	576	598	118	797	328
19.	998	587	948	895	396	466	683
	359	389	649	497	358	108	288

Written Problems

1. A dealer bought a horse for $155 and sold it for $212. How much did he gain?

2. A man deposited in the bank $850. He drew out $278; how much was left?

3. From 842 subtract 585.

4. From 902 subtract 585.

5. From 572 subtract 147.

6. A man earns $920 a year and spends $865. How much does he have left?

7. Out of a debt of $250, $175 is paid. How much remains to be paid?

8. In a school having both boys and girls there are 164 children in all. 85 of the children are boys. How many are girls?

9. A farmer had 216 sheep and sold 138 of them. How many were left?

10. A dealer bought 500 acres of land. He sold 185 acres. How much was left?

11. The Washington Monument is about 555 ft. high. The tallest pyramid in Egypt is 480 ft. What is the difference in their heights?

12. Fred took an automobile journey of 400 miles with his father. They went 65 miles the first day, 74 the second, and 83 the third. How many miles had they then gone? How much farther had they to go?

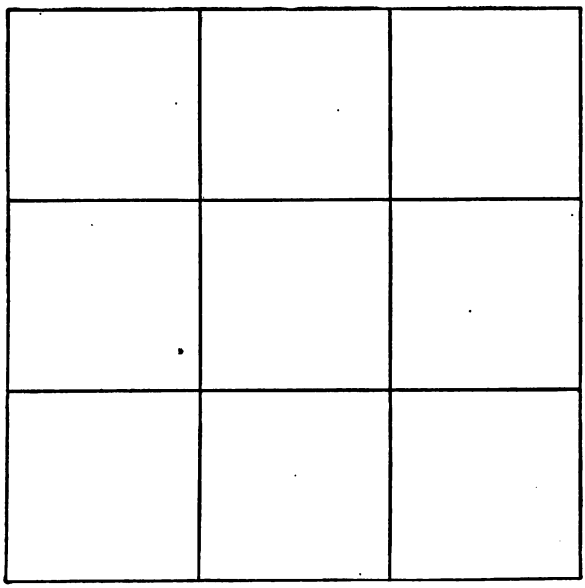


FIG. A

Oral Exercise

1. The upper row of Figure *A* is 1 inch wide and contains 3 square inches. How long is it?

2. The whole of Figure *A* contains 9 square inches. How wide is it? How long is it?

3. If a surface is 2 inches wide and contains 6 square inches, how long is it?

4. An oblong of 4 sq. ft., 1 ft. wide must be —— ft. long.

5. An oblong of 8 sq. in., 2 in. wide must be —— in. long.

6. A surface containing 10 square inches which is 5 inches long must be —— inches wide.

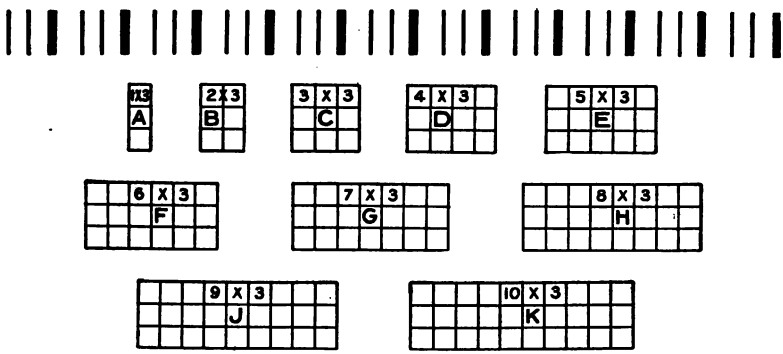
Oral Exercise

1. How many sides has the triangle A?

2. A and B together have —— sides. 2 times 3 = —.

3. A, B, and C together have —— sides. A, B, C, and D have —— sides. $3 \times 3 =$ —. $4 \times 3 =$ —.

4. Count the marks by 3's:



5. How many squares are there in A? in B? in C? D? E? F? G? H? J? K?

6. If A is 1, what is B? C? D? etc.

7. If A is 3, what is B? C? D? etc.

8. $2 \times 3 =$ — $3 \times 3 =$ — $4 \times 3 =$ — $5 \times 3 =$ —

9. $6 \times 3 =$ — $7 \times 3 =$ — $8 \times 3 =$ — $9 \times 3 =$ —

10. 6 = — times 3 18 = — times 3 24 = — times 3

11. 30 = — times 3 21 = — times 3 15 = — times 3

12. $15 \div 3 =$ — $12 \div 3 =$ — $21 \div 3 =$ — $6 \div 3 =$ —

13. $27 \div 3 =$ — $30 \div 3 =$ — $24 \div 3 =$ — $9 \div 3 =$ —

Oral Exercise

1. Repeat from memory the table of 2's, of 4's, of 8's.

2. Read, write, and learn these tables of 3's:

a	*b*	*c*	*d*
$1 \times 3 = 3$	$3 \times 1 = 3$	$3 \div 3 = 1$	$3 \div 1 = 3$
$2 \times 3 = 6$	$3 \times 2 = 6$	$6 \div 3 = 2$	$6 \div 2 = 3$
$3 \times 3 = 9$	$3 \times 3 = 9$	$9 \div 3 = 3$	$9 \div 3 = 3$
$4 \times 3 = 12$	$3 \times 4 = 12$	$12 \div 3 = 4$	$12 \div 4 = 3$
$5 \times 3 = 15$	$3 \times 5 = 15$	$15 \div 3 = 5$	$15 \div 5 = 3$
$6 \times 3 = 18$	$3 \times 6 = 18$	$18 \div 3 = 6$	$18 \div 6 = 3$
$7 \times 3 = 21$	$3 \times 7 = 21$	$21 \div 3 = 7$	$21 \div 7 = 3$
$8 \times 3 = 24$	$3 \times 8 = 24$	$24 \div 3 = 8$	$24 \div 8 = 3$
$9 \times 3 = 27$	$3 \times 9 = 27$	$27 \div 3 = 9$	$27 \div 9 = 3$
$10 \times 3 = 30$	$3 \times 10 = 30$	$30 \div 3 = 10$	$30 \div 10 = 3$

3. In 1 yard there are —— feet. In 2 yards there are —— feet. In 3 yards there are —— feet.

4. In 12 feet there are —— yards. In 15 feet there are —— yards. In 18 feet there are —— yards.

5. A road that is 10 yards wide is —— feet wide.

6. If a family uses 3 quarts of milk a day, in a week and 2 days it will use —— quarts.

7. At 3 cents each, 8 newspapers will cost —— cents.

8. From a 30 gallon cask a 3 gallon jug can be filled —— times.

9. What is the cost of three 5 cent stamps and ten 1 cent stamps?

10. In 3 weeks and 4 days there are how many days?

Oral Exercise

1. Carlton has 4 pockets and has 3 cents in each pocket and 1 nickel besides. He has —— cents in all.

2. How much will 3 glasses of soda cost at 5 cents a glass? If I give a quarter of a dollar for the soda, what change should I receive?

3. 5 pencils cost 15 cents. How much does 1 pencil cost? How much will 10 pencils cost?

4. $3 \times 2 = 2 \times$ ——. $4 \times 3 = 3 \times$ ——.

5. 18 cakes are divided among 6 girls. How many does each receive? What part of 18 would 3 girls receive? What part would 2 girls receive?

6. At 3 cents each, how much do 7 bananas cost?

7. An oblong is 3 in. long by 2 in. wide. How many square inches does it contain?

8. How many sticks 3 in. long will make 2 ft. in length?

9. Count by 3's from 3 to 30.

10. Count by 3's backward from 30 to 3.

11. Count by 3's from 1 to 31.

12. Count by 3's from 2 to 32.

13. $8 \times 3 = 3 \times$ ——. $4 \times 7 = 7 \times$ ——.

14. 3 \$10 bills with 2 \$5 bills are how many dollars?

15. There are 3 hours of school each forenoon. How many hours of school are there in 8 forenoons? in 9?

16. 3 times 4 and 2 more are ——.

17. 3 times 7 and 3 more are ——.

Oral or Written Exercise

1. $(6 \times 3) + 1 =$ ——.
2. $(9 \times 3) + 2 =$ ——.
3. $(8 \times 3) + 2 =$ ——.
4. $(6 \times 3) + 3 =$ ——.

5. I walked 12 miles in 3 hours. How far did I walk in 1 hour?

6. 7×3 pints = —— quarts and —— pint.

7. There are —— 3's in 15. There are in 17 —— 3's and —— over.

8. There are —— 3's in 27. In 28 there are —— 3's and —— over.

9. $26 = (8 \times 3) +$ ——.
10. $31 = ($—— $\times 3) + 1$.

11. In 3 pecks and 2 quarts there are —— quarts.

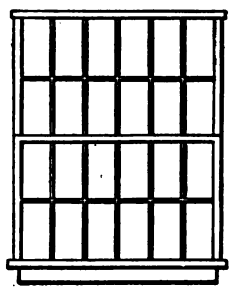
12. Multiply each of the following from left to right by 3, and add 2 to each product:

4, 7, 5, 8, 6, 3, 10, 2, 9, 1.

Divide each of the following by 3:

13. 9 12 6 15 21 18 3 27 30 24.
14. 11 13 8 17 22 19 5 28 32 26.

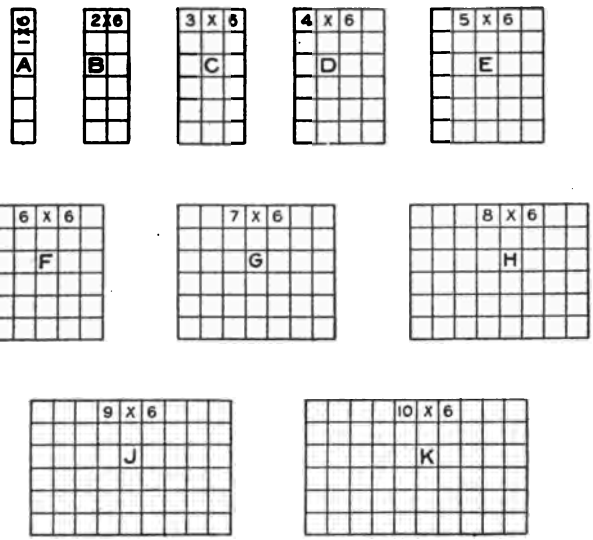
Oral Exercise



1. There are —— panes of glass in each row in the window.

2. In the upper two rows there are 2 times ——, or —— panes.

3. In 3 rows there are $3 \times$ ——, or —— panes, and in the 4 rows there are $4 \times$ ——, or —— panes.



Oral Exercise

1. There are —— squares in A.

2. There are —— times —— squares in B.

3. If A is 1, B is ——, C is ——, D is ——, E is ——, F is ——, G is ——, H is ——, J is ——, K is ——.

4. If A is 6, what is B? C? D? E? F? G? H? etc.

5. $2 \times 6 = —$ $3 \times 6 = —$ $4 \times 6 = —$ $5 \times 6 = —$

6. $6 \times 6 = —$ $7 \times 6 = —$ $8 \times 6 = —$ $9 \times 6 = —$

7. $60 \div 6 = —$ $36 \div 6 = —$ $42 \div 6 = —$ $48 \div 6 = —$

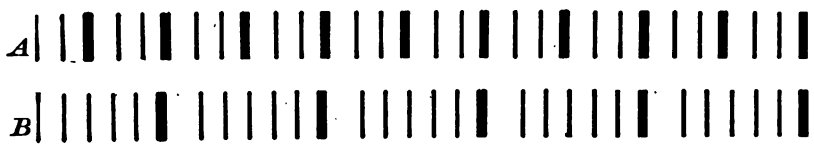
8. $12 = — \times 6$ $24 = — \times 6$ $30 = — \times 6$

9. $36 = — \times 6$ $42 = — \times 6$ $54 = — \times 6$

Oral and Written Exercise

1. Count by 6's to 60 and back:

2. Count line *A* by 3's. Count line *B* by 6's.



3's:	3	6	9	12	15	18	21	24	27	30.
6's:		6		12		18		24		30.

NOTE. The teacher should call attention to the similarity of the two series.

3. Repeat from memory the tables of 2's, 3's, 4's, 5's.

4. Read, write, and learn these tables of 6's:

a	*b*	*c*	*d*
$1 \times 6 = 6$	$6 \times 1 = 6$	$6 \div 6 = 1$	$6 \div 1 = 6$
$2 \times 6 = 12$	$6 \times 2 = 12$	$12 \div 6 = 2$	$12 \div 2 = 6$
$3 \times 6 = 18$	$6 \times 3 = 18$	$18 \div 6 = 3$	$18 \div 3 = 6$
$4 \times 6 = 24$	$6 \times 4 = 24$	$24 \div 6 = 4$	$24 \div 4 = 6$
$5 \times 6 = 30$	$6 \times 5 = 30$	$30 \div 6 = 5$	$30 \div 5 = 6$
$6 \times 6 = 36$	$6 \times 6 = 36$	$36 \div 6 = 6$	$36 \div 6 = 6$
$7 \times 6 = 42$	$6 \times 7 = 42$	$42 \div 6 = 7$	$42 \div 7 = 6$
$8 \times 6 = 48$	$6 \times 8 = 48$	$48 \div 6 = 8$	$48 \div 8 = 6$
$9 \times 6 = 54$	$6 \times 9 = 54$	$54 \div 6 = 9$	$54 \div 9 = 6$
$10 \times 6 = 60$	$6 \times 10 = 60$	$60 \div 6 = 10$	$60 \div 10 = 6$

5. Multiply 1, 3, 5, 4, 7, 9, 6, 2, 8, 10, each by 6.

Oral Exercise

1. If 6 pints of milk cost 18 cents, 1 pint costs —— cents. 1 quart costs —— cents.

2. If a rose has 5 petals, how many petals have 6 roses?

3. There are how many pegs in 6 rows of 6 pegs each?

4. How much will 7 tons of coal cost, at $6 a ton?

5. If a man earns $6 a day, how much does he earn in 4 days? in $4\frac{1}{2}$ days?

6. A farmer had 30 sheep and sold $\frac{1}{5}$ of them. How many did he sell? How many were left?

7. At 6 cents a pound, how much will 8 pounds of sugar cost? How much change shall I receive if I give a half dollar in payment?

8. $6 \times 8 = 8 \times$ ——. $7 \times 6 = 6 \times$ ——.

9. 6 is —— of 24. 6 is —— of 18.

10. 6 is —— of 12. 6 is —— of 36.

11. $6 + 6 + 6 + 10 =$ ——. 12. $11 - 6 + 5 =$ ——.

13. 6 inches is —— of a foot. It is —— of 2 feet.

14. 6 inches is —— of $1\frac{1}{2}$ feet. 15. Six $10 bills = $——.

16. For 19 cents I can buy 6 —— cent stamps and a —— cent stamp.

17. For 25 cents I can buy 6 —— cent oranges, or 4 —— cent oranges and have 1 cent left.

Oral Exercise

1. Each number in the upper half of the wall chart is $\frac{1}{3}$ of ——. It is $\frac{1}{2}$ of ——. $\frac{1}{4}$ of ——. $\frac{1}{5}$ of ——.

2. Each number in the lower half of the chart is 3 times ——. If each number is the cost in cents of a chain 1 yard long, what is the cost of 1 foot of the chain?

3. If $\frac{1}{3}$ of a melon costs —— ct.,* what does the whole melon cost?

4. What would be the cost of a whole melon if —— ct.* were the cost of $\frac{1}{8}$ of it?

WALL CHART

2	4	5	3
9	10	8	7
6	9	7	1
6	24	18	21
27	9	3	27
12	30	15	24

Written Exercise

Add upward, and prove by adding downward:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	6	5	4	7	59	4	77	79
	1	8	7	7	4	85	54	86
	8	9	9	8	38	58	66	79
	16	20	22	47	44	18	38	39

Subtract and prove:

	a	*b*	*c*	*d*	*e*	*f*
2.	852	952	578	848	924	963
	154	647	79	366	577	499

* Supply numbers from the upper half of the Chart.

Oral Exercise

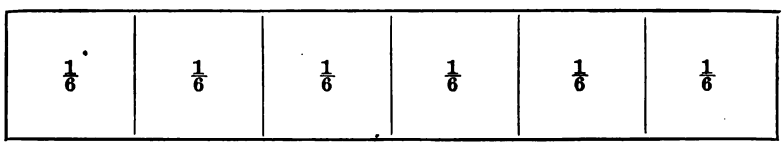
1. At \$6 a cord 2 cords of wood cost —— dollars.

2. At 6¢ a pound 4 pounds of sugar cost —— ¢. 5 pounds cost —— ¢.

3. There are —— 6's in 18. There are —— 6's in 36.

4. Count the faces of a cube. On 7 cubes there are —— faces.

5. At the rate of 6 miles an hour a horse can travel —— miles in 9 hours.



6. The oblong above is made up of 6 squares. The whole oblong is how many times as large as one square? Each of the squares is what part of the whole oblong?

One sixth is one of the six equal parts of the whole. It is written $\frac{1}{6}$.

7. In $\frac{1}{6}$ of a foot there are —— inches.

8. In $\frac{1}{6}$ of a dozen there are —— things.

9. 24 hours make a day; $\frac{1}{6}$ of a day is —— hours.

10. 36 inches make a yard; $\frac{1}{6}$ of a yard is —— inches.

11. There are 30 days in April. There are —— days in $\frac{1}{6}$ of the month.

Oral Exercise

1. Multiply the following from left to right by 6:

2, 4, 6, 5, 9, 1, 10, 8, 7, 3.

2. Multiply each of the above by 6 and add 5 to each product, going from right to left.

Divide each of the following numbers by 6:

3. 60 18 30 12 24 6 54 36 42 48 54.

4. 63 21 35 19 28 11 56 41 46 53 57.

5. Count by 6's from 1 to 43; from 5 to 47.

6. How many square inches are there in an oblong 6 in. long by 1 in. wide? In a square whose edge is 6 inches?

7. How wide is an oblong which is 6 inches long and which contains 18 square inches? Make a picture of it.

8. How many square feet are there in a garden bed which measures 9 ft. long by 6 ft. wide?

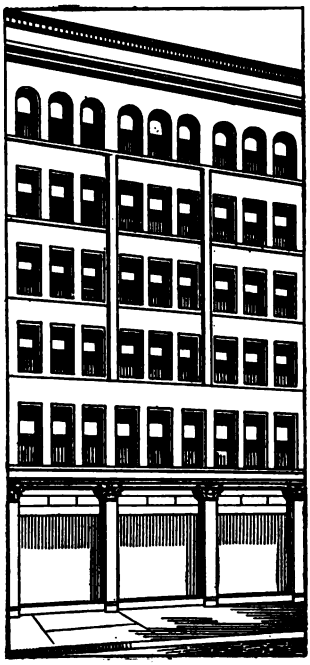
9. A rug contains 42 sq. ft. It is 6 ft. by —— ft.

10. Ezra works 6 days in a week at $1 a day. To earn $63, how many weeks and days over does he work?

Written Exercise

Add:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
8	9	6	4	7	8	7	6	4	5
3	4	7	9	8	4	5	5	3	9
9	9	8	7	8	6	8	6	7	6
5	18	28	29	10	49	34	28	39	16



Oral Exercise

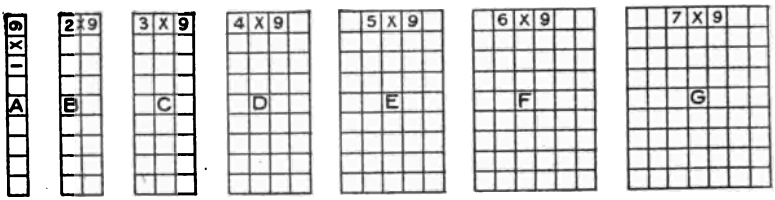
1. There are —— windows in each story of this building.

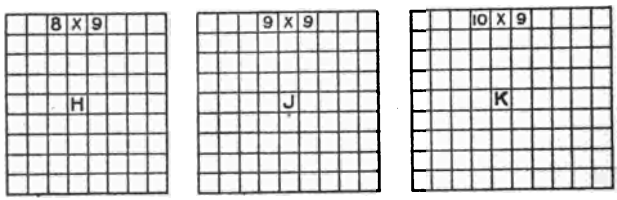
2. In the top story and the next below it there are —— windows. $2 \times 9 =$ ——.

3. There are —— windows in the upper 3 stories. $3 \times 9 =$ ——.

4. There are —— windows in the upper 4 stories. $4 \times 9 =$ ——.

5. There are —— stories above the basement. There are —— windows above the basement. $5 \times 9 =$ ——.





Oral Exercise

1. There are —— squares in *A*, page 148.
2. In *A* there is —— 9; in *B* there are —— 9's; in *C* ——; in *D* ——; *E* ——; *F* ——; *G* ——; etc.
3. *A* is —— of *B*; —— of *C*; —— of *D*; —— of *E*.
4. 9 is —— of 18. 9 is —— of 27. 9 is —— of 36.
5. 18 is —— 9's 27 is —— 9's 36 is —— 9's
6. 45 is —— 9's 54 is —— 9's 63 is —— 9's
7. 72 is —— 9's 81 is —— 9's 90 is —— 9's
8. Read, write, and learn these tables of 9's:

a	*b*	*c*	*d*
$1\times9=9$	$9\times1=9$	$9\div9=1$	$9\div1=9$
$2\times9=18$	$9\times2=18$	$18\div9=2$	$18\div2=9$
$3\times9=27$	$9\times3=27$	$27\div9=3$	$27\div3=9$
$4\times9=36$	$9\times4=36$	$36\div9=4$	$36\div4=9$
$5\times9=45$	$9\times5=45$	$45\div9=5$	$45\div5=9$
$6\times9=54$	$9\times6=54$	$54\div9=6$	$54\div6=9$
$7\times9=63$	$9\times7=63$	$63\div9=7$	$63\div7=9$
$8\times9=72$	$9\times8=72$	$72\div9=8$	$72\div8=9$
$9\times9=81$	$9\times9=81$	$81\div9=9$	$81\div9=9$
$10\times9=90$	$9\times10=90$	$90\div9=10$	$90\div10=9$

Written Exercise

Multiply and add as in 1:

1.	2.	3.	4.
$2\times9=18$	$4\times9=$	$6\times9=$	$6\times9=$
$3\times9=27$	$5\times9=$	$1\times9=$	$2\times9=$
$5\times9=45$	$\times9=$	$\times9=$	$\times9=$

Oral Exercise

1. Multiply the following from left to right by 9, and add 2 to each product:

2, 10, 7, 5, 6, 4, 3, 8, 1, 9.

2. Multiply the above from right to left, and add 3 to each product. Multiply again, and add to each product 4, 5, 6, 7, or 8, as the teacher directs.

Divide each of the following numbers by 9:

3. 45 18 36 54 27 9 63 81 72 54 90.
4. 50 22 41 60 33 15 67 87 79 61 98.

5. Count by 9's from 1 to 100; from 5 to 50.

6. If a man earns $2 a day, how much does he earn in a week and a half, 6 days to a week?

7. A 3 inch square contains how many square inches?

8. How many square inches are there in an oblong 9 inches long by 1 inch wide? by 2 inches wide?

9. How many square feet are there in a square 9 feet each way?

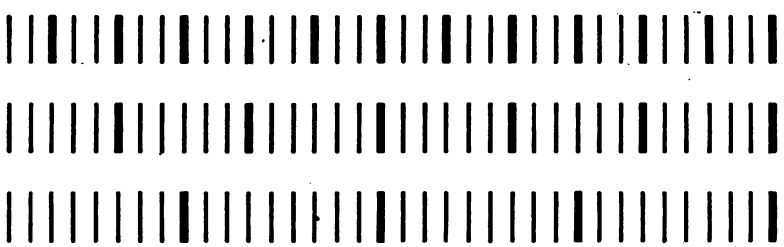
10. There are 9 children in enough rows to make 36 children in all. There are how many rows in all?

11. In the 26 letters of the alphabet there are how many times 3 and how many over? how many times 9 and how many over?

12. The cost of our kitchen coal for 9 months was $54. How much was this for a month? for $1\frac{1}{2}$ months?

Oral Exercise

1. Count by 9's to 90 and back.



NOTE. In the above arrangement of marks the teacher should call attention to the similarity and identity of parts as they occur in corresponding series. (See Note, p. 113.)

2. Count these marks by 3's, 6's and 9's, thus:

3's: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36.
6's: 6, 12, 18, 24, 30, 36.
9's: 9, 18, 27, 36.

3. Repeat from memory the table of 3's and 6's.

4. Charles is $\frac{1}{4}$ as old as his father. If his father is 36 years old, how old is Charles?

5. At 9¢ an hour, Francis will earn 72¢ in —— hours.

6. 9 cucumbers at 5¢ each cost ——¢.

7. At 9¢ a pound, 6 pounds of beef will cost ——¢.

8. A bill of $90 can be paid with how many $10 bills?

9. If 9 children are $\frac{1}{6}$ of all the children in school, how many are there in the school?

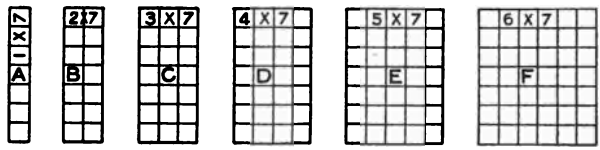
10. What is the cost of 4 tons of hay at $9 a ton?

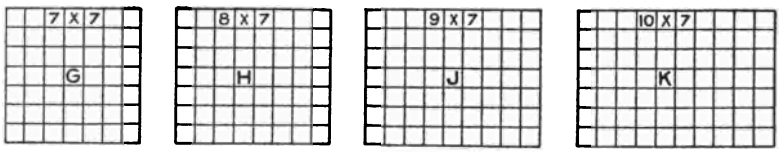
Oral and Written Exercise

1. Count these marks by 7's:

2. Count by 7's from 7 to 70.

3. Count backward from 70 to 7 by 7's:





4. Read, write, and learn these tables of 7's:

a	*b*	*c*	*d*
$7 \times 1 = 7$	$1 \times 7 =$ —	$7 \div 7 =$ —	$7 \div 1 =$
$7 \times 2 = 14$	$2 \times 7 =$ —	$14 \div 7 =$ —	$14 \div 2 =$
$7 \times 3 = 21$	$3 \times 7 =$ —	$21 \div 7 =$ —	$21 \div 3 =$
$7 \times 4 = 28$	$4 \times 7 =$ —	$28 \div 7 =$ —	$28 \div 4 =$
$7 \times 5 = 35$	$5 \times 7 =$ —	$35 \div 7 =$ —	$35 \div 5 =$
$7 \times 6 = 42$	$6 \times 7 =$ —	$42 \div 7 =$ —	$42 \div 6 =$
$7 \times 7 = 49$	$7 \times 7 =$ —	$49 \div 7 =$ —	$49 \div 7 =$
$7 \times 8 = 56$	$8 \times 7 =$ —	$56 \div 7 =$ —	$56 \div 8 =$
$7 \times 9 = 63$	$9 \times 7 =$ —	$63 \div 7 =$ —	$63 \div 9 =$
$7 \times 10 = 70$	$10 \times 7 =$ —	$70 \div 7 =$ —	$70 \div 10 =$

Oral Problems

1. An 8 story building has 9 windows in each story. There are —— windows in all.

2. If 4 men can do a piece of work in 9 days, 1 man can do it in —— days.

3. If 1 man can do a piece of work in 36 days, 4 men can do it in —— days.

4. There are 5 shelves in a bookcase, and 9 books on a shelf. There are —— books in all.

REVIEW OF COMBINATIONS

Written Exercise

(Review combinations of 10's, 5's, 2's, and 4's, on page 116.)

Copy, and write the products:

1. 3×1, 1×3 =

2. 3×2, 2×3, 6×1, 1×6 =

3. 4×2, 2×4, 8×1, 1×8 =

4. 7×1, 1×7 =

5. 3×3, 9×1, 1×9 =

6. 9×2, 2×9, 6×3, 3×6 =

7. 7×3, 3×7 =

8. 6×4, 4×6, 3×8, 8×3 =

9. 9×3, 3×9 =

10. 9×4, 4×9, 6×6 =

11. 7×6, 6×7 =

12. 8×6, 6×8 =

13. 7×7 =

14. 9×6, 6×9 =

15. 7×8, 8×7 =

16. 7×9, 9×7 =

17. 8×8 =

18. 9×8, 8×9 =

19. 9×9 =

Oral Exercise

1. 14 equals — 7's, 28 = — 7's, 56 = — 7's, 35 = — 7's.

2. In 4 weeks there are —— days. In 5 weeks there are —— days. In 3 weeks there —— days.

3. In 42 days there are —— weeks.

4. If 7 pails of lard weigh 70 pounds, 1 pail of lard weighs —— pounds.

5. A man walks 63 miles in 7 days. In 1 day he walks —— miles.

6. At $7 a week for board, what is the price a day?

7. How many shoes are required to shoe a horse? to shoe an ox? to shoe 7 horses? 7 oxen?

8. A room 7 feet wide must be how long to contain 70 square feet?

Add and subtract:

9.

14	28	56	21	42	35	49	63
7	7	7	7	7	7	7	7

Divide:

10. $28 \div 7 =$ —— $21 \div 7 =$ —— $35 \div 7 =$ ——

11. $42 \div 7 =$ —— $49 \div 7 =$ —— $56 \div 7 =$ ——

Read, and give answers:

12. $\frac{1}{2}$ of 4, of 40, 6, 60, 8, 80, 10, 100, 12, 14, 16, 18.

13. $\frac{1}{3}$ of 3, of 30, 6, 60, 9, 90, 12, 15, 21, 24, 27, 18.

14. $\frac{1}{4}$ of 4, of 40, 8, 80, 12, 16, 20, 24, 28, 32, 36.

15. $\frac{1}{5}$ of 5, of 50, 10, 100, 15, 20, 25, 30, 35, 40, 45.

Oral Exercise

Add by 7's:

	a	*b*	*c*
1.	From 1 to 71.	From 2 to 72.	From 3 to 73.
2.	From 4 to 74.	From 5 to 75.	From 6 to 76.

3. Multiply rapidly the following numbers by 7, going from left to right:

5, 3, 10, 2, 6, 5, 1, 4, 7, 8, 9.

4. Multiply the above from right to left by 7, and add 3 to each product. Multiply again, and add 4, 5, or 6, as the teacher directs.

Divide each of the following by 7:

5. 21 14 70 49 35 42 28 7 56 63.

6. 22 17 76 51 41 48 32 12 59 65.

7. June has how many days? How many weeks and how many days over are there in June? in July?

Written Exercise

Add:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
1.	55	86	68	88	89	48	98	6
	94	37	67	59	84	43	5	34
	27	67	17	97	99	97	86	67
	20	17	22	25	44	36	40	19

Subtract:

	a	*b*	*c*	*d*	*e*	*f*
2.	497	535	564	307	620	852
	358	248	476	159	578	605

A Drill Table for Multiplication

1	2	3	4	5	6	7	8	9	10
2	4	6	8						
3	6	9	12						
4	8	12	16	20	24	28	32	36	40
5					30			45	
6				30					
7							56		
8						56	64		
9			36						90
10								90	

NOTE. The teacher should give the pupils sheets of paper with the spaces marked off like the above table. Have the pupils copy the numbers given in the table above and then complete the table by filling in each space with the appropriate numbers, which should in each case be the product of the number at the head of the column and the number at the end of the row.

Make a similar table on the blackboard for general class use.

The part of the table inclosed by the heavy lines is the most difficult to learn, and hence requires the greatest amount of drill.

Written Exercise

Illustrative Example. What is the sum of each column and line of 32's written at the right?

$$32 =$$
$$32 + 32 =$$
$$32 + 32 + 32 =$$

EXPLANATION FOR THE TEACHER. We may find the answers to the illustrative example above by a much shorter method than by adding, that is, by making use of the multiplication tables which we have learned.

We know that $32+32+32$ is 3 times 32.

So, to find the answer we may either add or multiply thus:

ADDED	MULTIPLIED
32	32
32	3
32	96
96	

In multiplying, we say 3 times 2 ones are 6 ones, and write 6 under the line in the ones' place. Then, we say 3 times 3 tens are 9 tens, and write 9 under the line in the tens' place. 9 tens and 6 ones are 96. *Ans.* 96.

To verify or prove the work, add three 32's.

Multiply:

	a	*b*	*c*	*d*	*e*	*f*	*g*
1.	11	21	32	40	34	41	13
	9	4	3	2	2	3	3
2.	22	34	44	31	14	12	33
	4	2	2	3	2	4	3

3. A boy earns 24¢ a day. In 2 days he earns ——¢.

4. There are 13 books on each shelf of a bookcase. On 3 shelves there are how many books?

5. A gallon measure contains 231 cubic inches. My oil tank holds 3 gallons. How many cubic inches are there in it?

6. How many feet are there in a hedge bordering a square lawn which measures 122 feet on the side?

7. It took 3 men 133 days to lay a stone wall. How many days should it take 1 man to lay as much?

Written Exercise

Ill. Ex. (1) Multiply 46 by 3. (2) Multiply 248 by 3.

	ADDED	MULTIPLIED
(1)	46	46
	46	3
	46	$18 = 3 \times 6$ (ones)
	$18 = 6 + 6 + 6$ (ones)	$12 = 3 \times 4$ (tens)
	$12 = 4 + 4 + 4$ (tens)	$138 = 3 \times 46$
	$138 = 46 + 46 + 46$	

TEACHER'S EXPLANATION. To shorten the work of multiplying 46 by 3, we think, 3 times 6 (ones) = 18 (ones) = 1 ten and 8 ones. We write 8 under the line in the ones' place and reserve the 1 ten. Then we think 3 times 4 tens are 12 tens. 12 tens and the 1 ten which we reserved make 13 tens. We write 13 tens. 13 tens and 8 ones are 138. *Ans.* 138.

WORK SHORTENED

46
3
138

In a similar way we may multiply 248 by 3.

(2) 248
3
744

Thus: We think $3 \times 8 = 24$, = 2 tens and 4 ones. We write the 4 ones and reserve the 2 tens. 3×4 tens are 12 tens. 12 tens and the 2 tens which we reserved make 14 tens. 14 tens = 1 hundred and 4 tens. We write the 4 tens and reserve the 1 hundred. 3×2 hundreds = 6 hundreds. 6 hundreds and the 1 hundred which we reserved make 7 hundreds. We write 7 in the hundreds' place. 7 hundreds, 4 tens, and 4 ones make 744. *Ans.* 744.

Written Exercise

Multiply:

	a	*b*	*c*	*d*	*e*	*f*
1.	312	443	255	243	125	338
	2	2	5	4	3	2
2.	435	168	170	467	189	204
	2	4	5	2	3	3

3. A dealer sells three pianos at $325 each. How much does he receive for them?

4. Two fire engine horses cost $250 each. How much did the pair cost?

5. A drover bought 4 cows at $35 each. He paid —— dollars for the lot.

6. Mr. H. pays $25 per month for rent. For 5 months his rent is —— dollars.

7. A baker sells 323 loaves of bread each morning. In 4 mornings he sells —— loaves.

8. Three sewing machines at $38 each cost $ ——.

9. How many quarts of milk will a family use in a month of 31 days if it uses 1 gallon every day?

10. How many quarts of milk will a family use in a month of 31 days if it uses 3 qt. every day? What will be the cost at 7 cents a qt.?

11. There are 144 pens in a gross. How many are there in 2 gross? in 3 gross? in 6 gross?

12. There are 4 rooms in a school building. If each room has 48 seats, how many seats have the four rooms?

Written Exercise

Illustrative Example for the Teacher. Divide 69 by 3.

WORK

$$3\overline{)69}\quad 23$$

PROOF

$$\begin{array}{r} 23 \\ 3 \\ \hline 69 \end{array}$$

EXPLANATION. We write the number to be divided as in the margin. At its left we write the number we divide by, and above we write the quotient.

3 is contained in 6 tens 2 (tens) times. We write 2 in the tens' place above the line. 3 is contained in 9 ones 3 times. We write 3 in the ones' place above the line. 2 tens with 3 ones = 23. *Ans.* 23.

	a	*b*	*c*	*d*	*e*
1.	$2\overline{)24}$	$3\overline{)36}$	$3\overline{)66}$	$3\overline{)69}$	$4\overline{)80}$
2.	$2\overline{)28}$	$3\overline{)39}$	$4\overline{)88}$	$3\overline{)93}$	$5\overline{)55}$

	a	*b*	*c*
3.	$66 \div 3$	$\frac{1}{5}$ of 50	$\frac{1}{2}$ of 248
4.	$93 \div 3$	$\frac{1}{5}$ of 500	$\frac{1}{5}$ of 20
5.	$48 \div 4$	$39 \div 3$	$\frac{1}{5}$ of 200
6.	$484 \div 4$	$390 \div 3$	$448 \div 4$
7.	$669 \div 3$	$66 \div 6$	$446 \div 2$
8.	$\frac{1}{3}$ of 966	$\frac{1}{3}$ of 660	$960 \div 3$

9. Find the cost of $\frac{1}{2}$ bu. of potatoes at 86¢ a bushel.

10. Of a train of 96 freight cars $\frac{1}{3}$ are loaded. How many are loaded?

11. If $\frac{1}{5}$ of 85 gallons of oil leaks out, how many gallons are lost? How many remain?

Written Exercise

Ill. Ex. (1) Divide 72 by 3. (2) Divide 295 by 5.

(1)
WORK
24
3)72

PROOF
24
× 3
72

TEACHER'S EXPLANATION. 3 is contained in 7 tens 2 (tens) times and 1 ten over. Write 2 in the tens' place above the line.

The 1 ten left over with 2 ones = 12. 3 is contained in 12, 4 times. Write 4 in the ones' place above the line. 2 tens with 4 = 24. *Ans.* 24.

(2)
WORK
59
5)295

PROOF
59
× 5
295

In Ill. Ex. (2) as 2 hundreds divided by 5 gives no hundreds, we divide first 29 tens. 5 is contained in 29 tens 5 (tens) times and 4 tens over. Reserve the 4 tens, and write 5 in the tens' place above the line. The 4 tens reserved with the 5 ones = 45. 5 in 45, 9 times. Write 5 in the ones' place above the line. 5 tens with 9 = 59. *Ans.* 59.

To verify or prove the division, multiply the quotient by the divisor. The product should equal the number divided.

1. Divide 296 by 2, by 4, and by 8.
2. Divide 396 by 2, by 3, and by 6.
3. Divide 495 by 3 and by 5.
4. How many 5 cent loaves can be bought for 75 cents?
5. 5 days make a school week. How many school weeks are there in 140 days?

Oral Exercise

Read across the page, and give the answers:

1.	$10 \times 5 =$	$50 \div 5 =$	$500 \div 5 =$	6. $480 \div 6 =$
2.	$8 \times 7 =$	$56 \div 7 =$	$560 \div 7 =$	7. $350 \div 7 =$
3.	$9 \times 7 =$	$63 \div 7 =$	$630 \div 7 =$	8. $420 \div 6 =$
4.	$8 \times 9 =$	$72 \div 9 =$	$720 \div 9 =$	9. $320 \div 8 =$
5.	$9 \times 9 =$	$81 \div 9 =$	$810 \div 9 =$	10. $560 \div 8 =$

Written Exercise

	a	*b*	*c*	*d*
1.	$8\overline{)168}$	$9\overline{)198}$	$5\overline{)635}$	$9\overline{)279}$
2.	$4\overline{)124}$	$5\overline{)195}$	$6\overline{)774}$	$8\overline{)248}$
3.	$5\overline{)125}$	$6\overline{)204}$	$7\overline{)833}$	$5\overline{)985}$
4.	$3\overline{)189}$	$5\overline{)385}$	$8\overline{)816}$	$7\overline{)196}$

5. A man paid \$976 for wood at \$4 a cord. How many cords did he buy?

6. At \$7 a week for board, how many weeks' board will \$182 pay for?

7. By working 1 hour each day a man can do a piece of work in 136 days. How many days will it take him if he works 8 hours a day?

8. Edith's diary showed that she had spent 126 days in Europe. How many weeks was she there?

9. Change 720 cents to nickels; 708 feet to yards: 455 days to weeks; 296 pecks to bushels.

Oral Exercise

Read, and give results:

1. $30 \div 4 =$ — and — over.
2. $53 \div 5 =$ — and — over.
3. $67 \div 8 =$ — and — over.
4. $75 \div 9 =$ — and — over.
5. $30 \div 7 =$ — and — over.
6. $27 \div 10 =$ — and — over.
7. $44 \div 8 =$ — and — over.
8. $52 \div 6 =$ — and — over.

9. How many 10 cent balls can be paid for with 45 cents, and how many cents are left over?

10. How many 8 cent bunches of torpedoes can be bought with 50 cents, and how many cents will be left over?

11. How many dresses can be made from 25 yards of gingham if 6 yards are put into each dress, and how many yards will be left?

Written Exercise

Illustrative Example for the Teacher. Divide 427 by 5.

$$5\overline{)427} - 2 \qquad 85$$

PROOF

$85 \times 5 = 425$

$425 + 2 = 427$

EXPLANATION. In the illustrative example, if we try to divide 427 by 5 we find that there is a remainder of 2.

In proving work in division the remainder must be added to the product of the quotient and the divisor.

Divide and prove:

	a	*b*	*c*	*d*	*e*
1.	$3\overline{)437}$	$3\overline{)708}$	$4\overline{)927}$	$4\overline{)945}$	$5\overline{)747}$
2.	$6\overline{)254}$	$7\overline{)295}$	$8\overline{)569}$	$8\overline{)899}$	$7\overline{)756}$
3.	$8\overline{)177}$	$8\overline{)260}$	$8\overline{)365}$	$8\overline{)444}$	$9\overline{)288}$

Oral Test Exercise

1. In $1 there are how many half dollars? quarters?

2. How many quarters equal a half dollar? how many dimes?

3. Name the fewest pieces of money that you could exchange for a quarter dollar; for 90 cents.

4. How much more is the value of 3 dimes than 5 nickels? of a quarter dollar than 4 nickels?

5. I have 2 half dollars. If you have 3 quarter dollars, 2 dimes, and 2 nickels, how much more have you?

6. A blank book costs 10 cents, a pencil 5 cents, an eraser 2 cents. What is the change from a quarter dollar?

Written Exercise

When dollars and cents are written together, the dollars are separated from the cents by a dot called a **decimal point.** Thus, six dollars and thirty cents is written $6.30. 30 cents may be written $0.30 or $ .30.

Read, then find the sum and difference of the numbers in *a*; in *b*; in *c*; in *d*; in *e*.

	a	*b*	*c*	*d*	*e*
1.	$15.90;	$75.59;	$24.01;	$80.09;	$77.55;
	$0.25;	$0.63;	$.09;	$0.67;	$0.87.

Write, using the dollar sign and decimal point; then multiply or divide as indicated by × and ÷ signs:

2. 72 dollars 13 cents × 2.
3. 2 dollars 60 cents × 5.
4. 4 dollars 32 cents ÷ 8.
5. 30 dollars 80 cents ÷ 7.

Mental and Written Test Exercise

1. Write in figures the number made up of 7 tens 3 ones; of 7 hundreds 3 ones.

2. In a four-figure number what does the fourth figure stand for?

3. Write in Roman numerals seventeen; thirty-nine.

4. Add the ten numbers from 1 to 10. Write the sum.

5. Subtract $8+7$ from 8×7.

6. What name is given to the result of adding? of subtracting? of multiplying? of dividing?

7. How many square inches are there in an 8 inch square? How many inches is it around an 8 inch square?

8. How many 2 inch squares are there in a 4 by 8 in. oblong?

9. If you give a \$1 bill to pay for a 65¢ cap, what two pieces of money could make your change?

10. What name is given to the process of combining numbers to find their sum? to find their product?

11. In subtraction what is the whole number called? In division what is the number divided called?

12. If 7 dozen pinks cost 70 cents, how much will a dozen cost? a half dozen?

NOTE. The tests may be first read and studied by the pupil, or they may be dictated without previous study. Only answers should be required. These may be given in writing upon a paper slip numbered to correspond with the dictations. Similar tests, prepared and dictated by the teacher, should be a daily exercise.

Oral Exercise

1. Name in order the months in a year.

JANUARY						
S	M	T	W	T	F	S
..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	..	..
..	..	..	..	..	..	..

FEBRUARY						
S	M	T	W	T	F	S
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	..	..
..	..	..	..	..	..	..

MARCH						
S	M	T	W	T	F	S
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

APRIL						
S	M	T	W	T	F	S
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	..	..	..	..
..	..	..	..	..	..	..

MAY						
S	M	T	W	T	F	S
..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	..
..	..	..	..	..	..	..

JUNE						
S	M	T	W	T	F	S
..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	..	..	..	..	..	..

JULY						
S	M	T	W	T	F	S
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	..	..	..
..	..	..	..	..	..	..

AUGUST						
S	M	T	W	T	F	S
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
..	..	..	..	..	..	..

SEPTEMBER						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	..	..	..	..	..
..	..	..	..	..	..	..

OCTOBER						
S	M	T	W	T	F	S
..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	..	..
..	..	..	..	..	..	..

NOVEMBER						
S	M	T	W	T	F	S
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
..	..	..	..	..	..	..

DECEMBER						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

2. Which months have 31 days? 30 days? 28 days?

Once in 4 years February has 29 days. The year is then called a **leap year.**

Read and learn:

Thirty days have September,
April, June, and November;
All the rest have thirty-one,
Except February alone,
To which we twenty-eight assign,
Till leap year gives it twenty-nine.

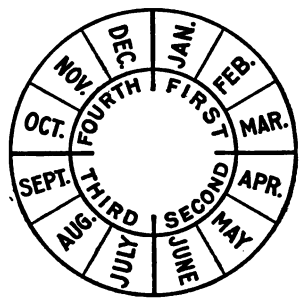
Oral Problems

1. How many months are there in 1 year? in 1 quarter of a year?

2. The first quarter of the year begins with January; the second quarter begins with ——; the third quarter begins with ——; the fourth quarter begins with ——.

3. Name the month that is 6 months from January 1; 6 months from April 1.

Circle of the Year



4. When Saturday is the first day of the month, name in order the days of the month of the other Saturdays.

Remember that the same day of the WEEK comes on the 1st, 8th, 15th, 22d, and 29th days of the month.

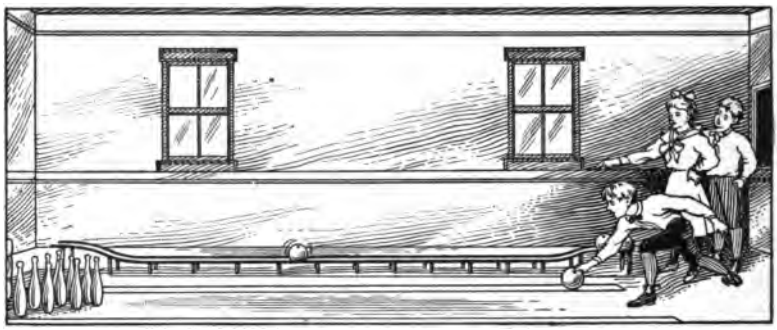
Written Exercise

1. Write in order the days of the month on which Sundays occur when Sunday is the second day of the month.

2. Find from the number of days in each month the number in a year. How many days are there in a leap year?

3. How many days are there in the first quarter of the year? in the second quarter? in the third quarter? in the fourth quarter?

4. How many weeks are there in a year?



Written Exercise

	1	2	3	4	5	6	7	8	9	10	Totals
Mabel	4	7	5	6	6	7	8	5	1	3	
Theodore	9	6	4	4	9	9	2	9	3	9	
Frank	6	2	1	7	4	9	9	4	7	8	

	1	2	3	4	5	6	7	8	9	10	Totals
Mabel	4	6	8	3	4	9	3	2	9	4	
Theodore	7	5	6	9	4	2	9	1	9	7	
Frank	5	7	1	6	9	9	6	7	9	6	

	1	2	3	4	5	6	7	8	9	10	Totals
Mabel	4	9	6	7	6	2	5	4	1	6	
Theodore	4	7	6	9	9	7	9	9	8	2	
Frank	9	5	9	4	1	3	7	3	9	6	

Mabel, Theodore, and Frank played three games of tenpins, the scores of which are given above. Reckon the scores in each game, compare results, and decide which one of the three is the best player.

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THIS book includes the study of the Hepatica, Spring Beauty, Adder's Tongue, Dutchman's Breeches, Squirrel Corn, Jack-in-the-Pulpit, and the Trilliums, and is prepared on a somewhat novel plan, combining note-taking, composition work, and drawing, for the third, fourth, and fifth grades. For each flower there is a story which is intended as a reading lesson, followed by two pages of questions covering the complete physical description of the plant and its habits; after each question there is a blank space for the child's written answer. Two blank pages are left for a summary in writing, and two for drawing.

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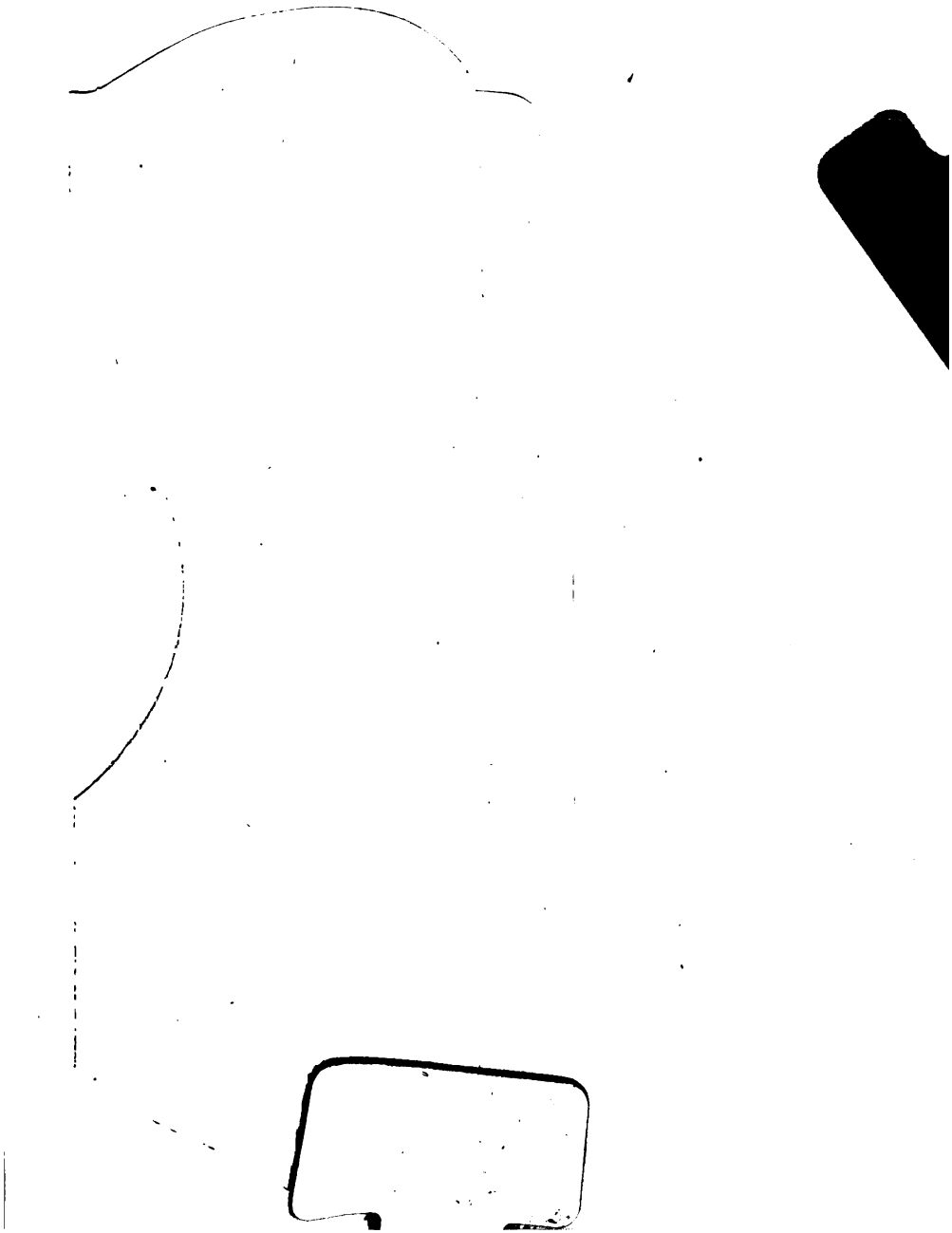

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